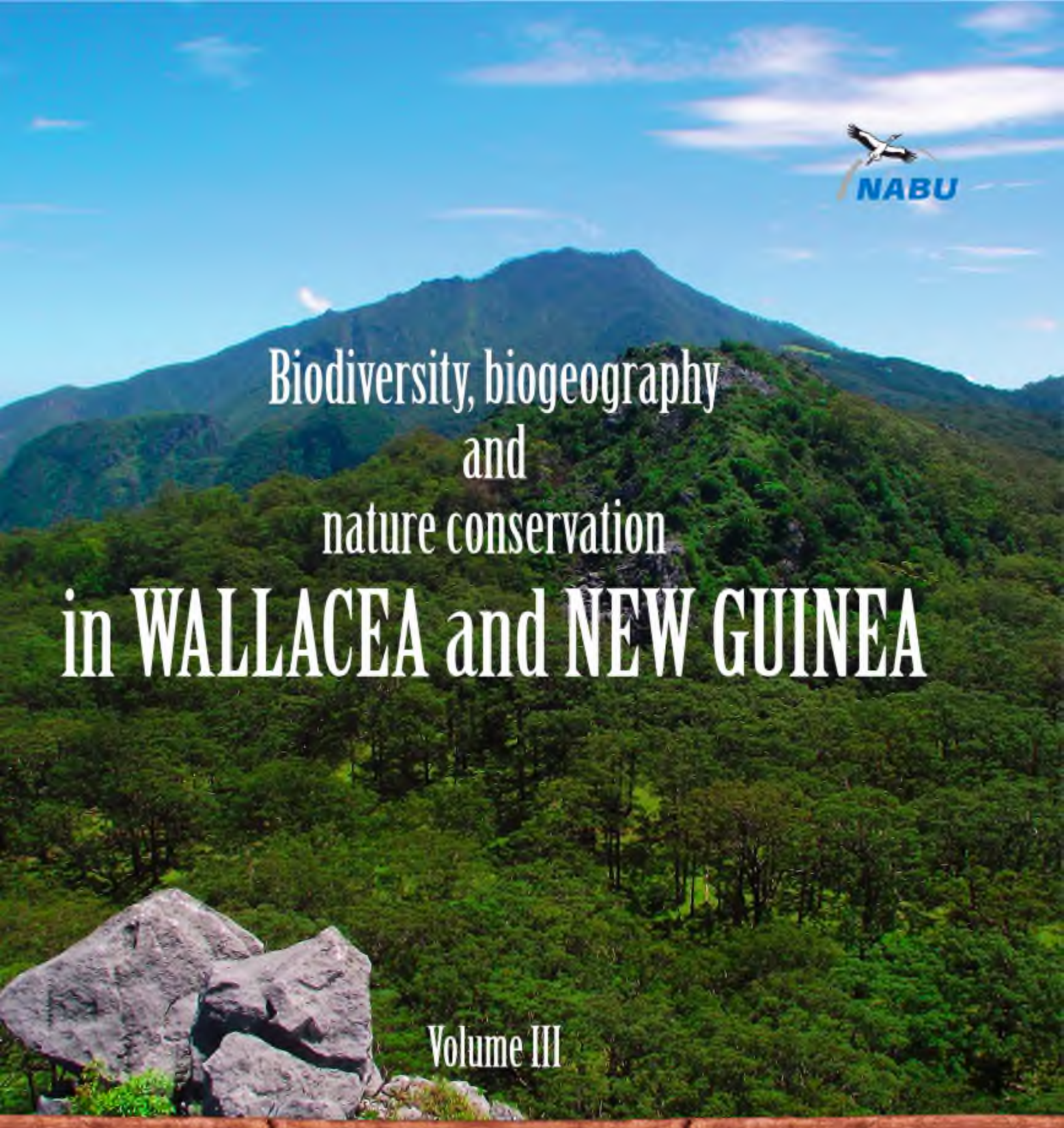


Biodiversity, biogeography and nature conservation in WALLACEA and NEW GUINEA

Volume III

Dmitry Telnov (executive editor)
Maxwell V.L. Barclay & Olivier S.G. Pauwels

The Entomological Society of Latvia
Riga, 2017



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Title page photo: Mount Mutis in West Timor (photo: L. Wagner, 2016; published with permission) on a background of traditional wood carving by Lake Sentani Papuans.

This volume is dedicated to all the environmentalists,
rangers and scientists who selflessly lost their lives
in safeguarding our future, and increasing humanity's
knowledge of the biodiversity of our planet



photo: D. Telnov, 2012

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Foreword

George W. Beccaloni
Director of the A.R. Wallace Correspondence Project, London, United Kingdom; g.beccaloni@gmail.com

Alfred Russel Wallace (1823-1913) made an immense contribution to our understanding of the biodiversity and biogeography of Wallacea, New Guinea and indeed the rest of the World. Not only did he independently discover the process of evolution by natural selection, publishing the idea together with Charles Darwin in 1858, but he is regarded as the founding father of evolutionary biogeography thanks to his many seminal publications on the subject, including his books *The Geographical Distribution of Animals* and *Island Life*.

Wallace also made a huge contribution towards documenting the animal fauna of what he called The Malay Archipelago (Malaysia, Singapore, Indonesia and East Timor). He spent nearly 8 years in the region from 1854 to 1862, collecting specimens of insects, birds and other animals for his private collection, selling the "duplicates" to collectors and museums in order to fund his trip. Wallace collected specimens from Peninsular Malaysia across to New Guinea, visiting every important island in the archipelago at least once, and clocking-up about 14000 miles of travel. During his trip he collected an astonishing total of nearly 126000 animal specimens: about 110000 insects, 7500 shells, 8050 bird skins, and 410 mammals and reptiles. They ranged from Orangutans to Birds of Paradise, from land snails to cockroaches, from Birdwing butterflies to tiny parasitic wasps. Remarkably, most of them arrived in England in good condition, an impressive achievement considering the difficult conditions under which he was working, and the complex logistics of shipping fragile specimens back from the remote wild corners of the Malay Archipelago.

Wallace kept about 18% of the specimens that he and his assistants collected, which by the end of his trip amounted to 3000 bird skins of about a 1000 species, at least 20000 beetles and butterflies of about 7000 species, plus some vertebrates and land-shells. When he returned to England he used these to gain insights into evolutionary and biogeographic processes, and published 21 scientific articles in which he described 295 new species: 120 butterflies, 70 beetles and 105 birds. At least 4700 other species were described in about 350 additional publications by leading amateur and professional naturalists based on specimens from Wallace's private collection and the duplicates his agent Samuel Stevens had sold. About 250 of these were named after him, usually as *wallacii* or *wallacei*.

Wallace's best known zoological discoveries from the region are perhaps Rajah Brooke's Birdwing Butterfly (*Trogonoptera brookiana*) from Borneo, Wallace's Golden Birdwing Butterfly (*Ornithoptera croesus*) from Bacan Island, Indonesia and Wallace's Standard-Wing Bird of Paradise (*Semioptera wallacei*) from the same island. He also discovered the world's first gliding frog (Wallace's Flying Frog, *Rhacophorus nigropalmatus*) in Borneo, and the world's largest bee (Wallace's Giant Bee, *Chalicodoma pluto*), on Bacan Island. He collected a total of 212 new bird species (naming about half of them himself), so given that around 10000 bird species are known, this means that he was responsible for discovering 2% of the entire World bird fauna. Not only that, but he was the first Westerner to observe and document the spectacular mating displays (leks) of male Birds of Paradise, and he was probably the first European to eat one (he frequently ate birds after skinning them because he was often short of food).

The bulk of the specimens which Wallace collected are now in the collections of London's Natural History Museum and the Oxford University Museum, although many other museums in the U.K., Europe, the U.S.A. and Australia also have Wallace material.

This book, the third in the series, continues the monumental task of documenting and naming the organisms found in New Guinea and adjacent regions. Wallace would have thoroughly approved of this endeavour. As he wrote in his 1863 paper "On the physical geography of the Malay Archipelago": "It is for such inquiries that the modern naturalist collects his materials; it is for this that he still wants to add to the apparently boundless treasures of our national museums, and will never rest satisfied as long as the native country, the geographical distribution, and the amount of variation of any living thing remains imperfectly known. He looks upon every species of animal and plant now living as the individual letters which go to make up one of the volumes of our earth's history; and, as a few lost letters may make a sentence unintelligible, so the extinction of numerous forms of life which the progress of cultivation invariably entails will necessarily obscure this invaluable record of the past".

Editorial

The Wallacea island group has always fascinated biologists, naturalists and travelers. Its complicate geological history and the immense variety of its landscapes make of it an incredibly rich area in terms of biodiversity, with an impressive proportion of endemics. However, it remains poorly studied to date, and it is still an El Dorado for biologists in search of new species discoveries, and a fantastic laboratory to study evolutionary processes and insularity.

Studying this amazing biodiversity and how it evolved and lives does not only serve intellectual curiosity and scientific purposes. Like most tropical forests, those of Wallacea are increasingly threatened by human developments, and, as natural habitats degradation progresses, conservation measures are becoming urgent in a number of places and for more and more species. Explaining why these tropical forests and other biotopes should be preserved requires to know in the first place what species depend on them for their survival.

Similarly to the first two volumes of the series "Biodiversity, Biogeography and Nature Conservation in Wallacea and New Guinea", the present one demonstrates how incredibly diverse and underestimated the biodiversity of this archipelago is. Thanks to the hard work of Dmitry Telnov who dedicates a large part of his time – and personal resources – to this series, this new, third volume sees the day. It is a compilation of the efforts of numerous biologists from a large variety of countries, each of them possessing unique scientific skills, but all sharing a deep passion and respect for the natural wonders of our Planet. Their work reveals here numerous new taxa, belonging to biological groups as varied as bryophytes, snails, damselflies, pygmy grasshoppers, net-winged beetles, skinks, etc.

Many of them are relatively small, and wouldn't be noticed in the field by non-experts, but, as Dmitry likes to say, "The most beautiful things on Earth are not things": they are live beings, large or small. And each of them, to the most apparently insignificant by its size, is an opportunity of wonder, of hope and of surprise, and a good reason to peacefully battle to preserve the environment in which they live in order to ensure their future and ours.

Olivier S.G. Pauwels
Curator (Recent Vertebrates Collections)
Royal Belgian Institute of Natural Sciences
Brussels, Belgium; opauwels@naturalsciences.be



Beetles collected in the Malay Archipelago by A.R. Wallace. This drawer is from his private insect collection, now in London's Natural History Museum (photo © Natural History Museum, London).

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Like the previous volumes, this new work took more than two years to compile and produce, and was brought to fruition through the support of numerous generous people - our family members, friends and colleagues. **We would express our deep gratitude** to them as well as their institutions!

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Bryophytes from the Fiji Islands, VIII. The genus *Lejeunea* Libert (1820) (Jungermanniopsida)

Tamás Pócs [1], **Yu-Mei Wei** [2]

1 – Department of Botany, Institute of Biology, Eszterházy Károly University, Pf 43, H-3301, Eger, Hungary; e-mail: colura@upcmail.hu

2 – Guangxi Institute of Botany, Guangxi Zhuang Autonomous Region and the Chinese Academy of Sciences, 541006, Guilin, Guangxi, China; e-mail: wushuang-123@163.com

Abstract: Research done on Fiji Islands during this century contributed a lot to the knowledge of its rich bryoflora. At present 27 species, one subspecies and one variety of the genus *Lejeunea* Libert (1820) are known from the islands. *Lejeunea compacta* (Stephani) Stephani (1915), *L. eifrigii* Mizutani (1970), *L. exilis* var. *abnormis* (Herzog) G.E. Lee (2013), *L. flava* ssp. *moorei* (Lindberg.) R.M. Schuster (1957), *L. neelgherriana* Gottsche (1845), *L. papilionacea* Prantl (1892), *L. pulchriflora* (Pearson) G.E. Lee et al. (2016), *L. reinerae* Ilkiu-Borges (2005), and *L. tuberculosa* Stephani (1915) are newly reported from Fiji and two species new to science are to be described. Critical species are discussed and illustrated. The distribution pattern of all species is analyzed.

Key words: *Lejeunea,* Fiji, Melanesia, Pacific, Polynesia.

Introduction

The first *Lejeunea* Libert, 1820 record published from Fiji Islands was *Lejeunea sinclairii* Mitten from the collection of Seemann made in 1860 (Mitten 1862), which proved to be *Thysananthus fruticosus* (Lindenberg, Gottsche) Schiffner 1893 (Sukkharak 2015). Seemann's "Flora Vitiensis" (1865-1873) contains the description of further three *Lejeunea* species described by Mitten: *Lejeunea crassiretis* Mitten (1871), *L. uvifera* Mitten (1871) – now *L. flava* (Swartz) Nees (1838) and *L. procumbens* Mitten (1871) (Söderström et al. 2011). The next major contribution came much later, by Campbell (1971) who added *L. gracilipes* (Taylor) Spruce, 1884; *L. nietneri* (Stephani) Mizutani, 1973 (syn. of *Lejeunea flavida* Mitten, 1861) and *L. subigiensis* (Stephani) Stephani (1896). A breakthrough was the revision of the South Pacific *Lejeunea* species by Hürlimann (1993), who summarized the previous records and added his own collection and a key to the species known from the area. He recorded already 12 *Lejeunea* species from Fiji Islands, of which three were since transferred to other genera and one proved to be synonym. He introduced a new name: *Lejeunea mimula* Hürlimann (1993) for the illegitimate *Lejeunea luteola* (Stephani) Mizutani (1970) and tried to clarify the position of *Lejeunea patersonii* (Stephani) Stephani, 1915.

During 2003 Tamás Pócs with his wife Sarolta Pócs made a throughout collection in the islands. Then in 2008 and 2011 the Field Museum (Chicago, U.S.A.) organized intensive field trips with several participants in cooperation with the South Pacific Regional Herbarium, University of the South Pacific (see von Konrat et al 2011; Pócs et al. 2011), which resulted in five more *Lejeunea* species new to the islands and finally two species to be described as new to science. In the present paper we add seven further *Lejeunea* species and a variety, raising the number of *Lejeunea* taxa known from the flora of Fiji Islands to 27 species, one subspecies and two varieties, using the nomenclature of Söderström et al. (2016).

Materials and methods

In case of already published records in the summaries by Hürlimann (1993), Söderström et al. (2011), and Pócs et al. (2011) we only refer to the concerned sources and give detailed data only for the new island records. We enumerate synonyms only in exceptional cases and we refer to the full synonymy given in Zhu & So (2001), Söderström et al. (2011), and Lee (2013).



Abbreviations used in the text:

FIJ – Fiji Islands without allocation to an island;
Ka – Kadavu;
Ov – Ovalau;
Ta – Taveuni;
Va – Vanua Levu;
VL – Viti Levu Island.

EGR – Herbarium of the Eszterházy Károly University, Eger, Hungary;
F –Herbarium of the Field Museum, Chicago, USA;
HSNU – Herbarium of the East China Normal University, Shanghai, China;
SPRH – South Pacific Regional Herbarium, Suwa, Fiji.

Enumeration of the taxa of genus *Lejeunea* Libert (1820) known from Fiji Islands

Lejeunea alata Gottsche, 1845

References: Söderström et al. (2011: 419); Pócs et al. (2011: 468), VL.
New records: New to Ka: on the upper SW slopes of Mt. Delainabukalevu (Mt. Washington).
Epiphyllous in elfin forest below summit, at 700-800 m. E.A. Brown & M. von Konrat 1178/E, J, M and N. Altogether 14 records.
Illustrations: Zhu & So (2001: 138, fig. 53); Lee (2013: 395, figs 37-51).
Distribution: Palaeotropic species distributed from East Africa to Samoa (Miller et al. 1983; Wigginton 2009).

Lejeunea anisophylla Montagne, 1843

References: Söderström et al. (2011: 419); Pócs et al. (2011: 468).
It is far the commonest species all over the islands, occurring on different substrates, having already 97 records. It is the commonest on lowland and low montane areas in an altitudinal range from sea level to 600 m, the highest record came from 750 m.
Illustrations: Zhu & So (2001: 157, fig. 62); Lee (2013: 400, figs 68-82).
Distribution: A widespread Palaeotropical species distributed all over tropical Africa, Asia, Australia and in the Pacific.

Lejeunea apiculata Sande Lacoste, 1855

References: Söderström et al. (2011: 419); Pócs et al. (2011: 469), VL. Epiphyllous, at 1000 m.
Illustrations: Zhu & So (2001: 165, fig. 64), as *Stenolejeunea apiculata*; Lee (2013: 404, figs 83-100).
Distribution: Tropical Asia, Australia and in the Pacific.

Lejeunea caviloba (Stephani) Stephani in Bescherelle, 1898 (Figs 1-2)

References: Hürlimann (1993: 7); Söderström et al. (2011: 419), VL. New to Ta: Wainibau Valley on the SE coast, below the waterfalls, at 10 m, epiphyllous. S.& T. Pócs 03286/AU. Altogether five records, from 1-430 m alt.
Distribution: A mostly Pacific species (from New Caledonia to Hawaii) with occurrence also on Java (Miller et al. 1983).

Lejeunea cocoes Mitten, 1861

References: Söderström et al. (2011: 419); Pócs et al. (2011: 469), Ta, VL.
New records: New to Ka: Central part of the island, on the coastal ridge N of Vunisea, corticolous in dry evergreen *Gymnostoma vitiense* (Casuarinaceae) forest. S. & T. Pócs 03303/Z; S coast E of Vunisea, in coastal *Barringtonia* forest, 1-4 m, on bark. S. & T. Pócs 03308/D; 2-3 km NNE of Vunisea, along the Namara Road, on decaying wood in lowland rainforest at 120-165 m S. & T. Pócs 03300/G. SW end of the island, SE of Nabukalevu-ira village, coastal woodland of *Barringtonia asiatica* and *Hibiscus tiliaceus* just above the tidal level, on coconut base. T. Pócs & S. Bakata 1173/L. Same place, higher up on the slope, in *Barringtonia edulis* forest, 10-100 m, on bark. T. Pócs & S. Bakata 1174/AM, AO and AW. Altogether 20 records, mostly from coastal forests or coconut woodlands at 1-100 m alt, some up to 800 m.
Illustrations: Mizutani (1963: 177, figs. 10-18); So & Zhu (1998: 138, fig. 1); Lee (2013: 406, figs 101-116).
Distribution: Indomalesian-Pacific species with scattered occurrences from Chagos Archipelago to Fiji.

Lejeunea compacta (Stephani) Stephani, 1915

New records: New to Fiji Islands: Ka, Mt. Delainabukalevu (Mt. Washington), NW edge of summit crater. In cyclone damaged *Metrosideros* forest at 800 m alt., on *Metrosideros* bark, sterile. M.A.M. Renner 5771 (EGR, F and NSW 895648). Although only male plants were seen, the male branch agrees well with the description of Mizutani (1961).
Illustrations: Mizutani (1961: 158, figs16-24); Lee (2013: 409: figs. 117-134).
Distribution: Hitherto known only from Japan, Korea and from Sabah, East Malaysia (Lee 2013).





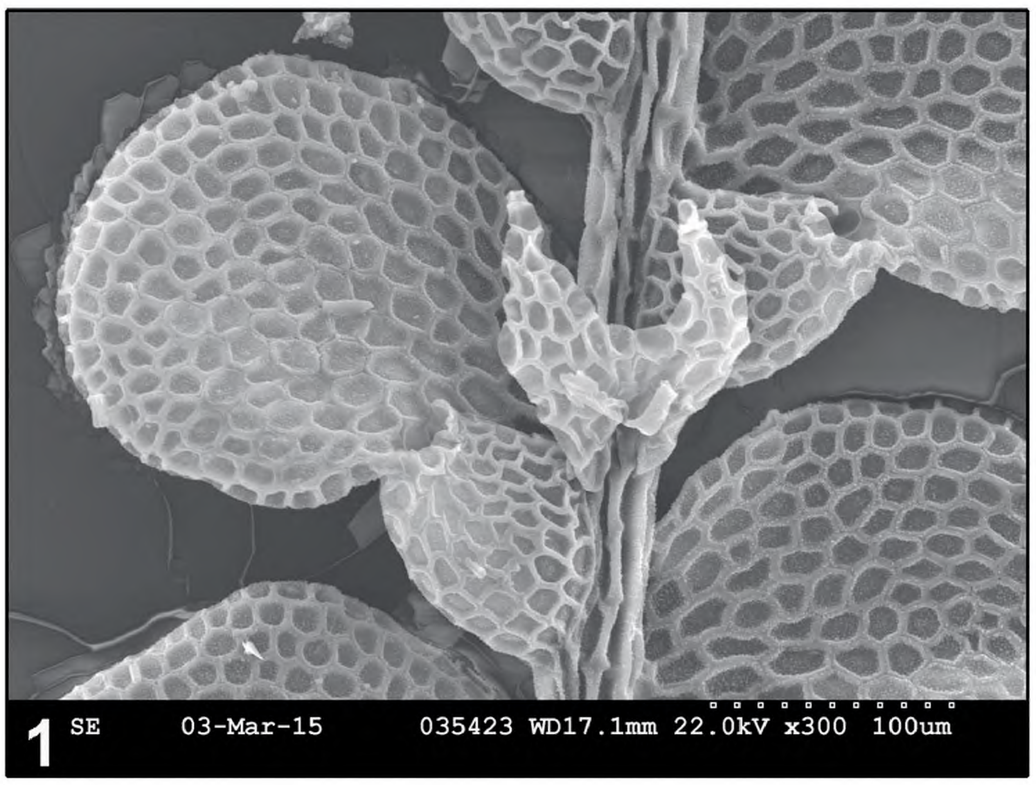

***Lejeunea crassiretis* Mitten, 1873**

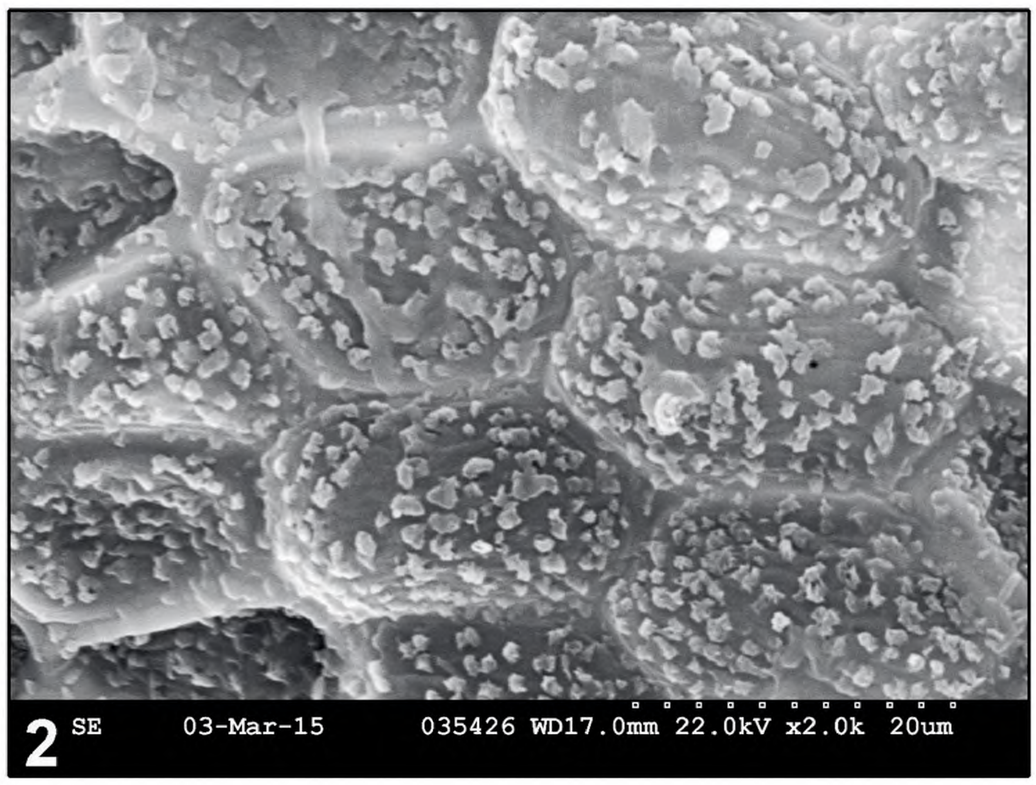
References: Mitten in Seemann (1873: 414); Thiers (1983), FIJ; Söderström et al. (2011: 419). Campbell (1971: 14) supplied seven records from VL: at altitudes between sea level and 825 m.

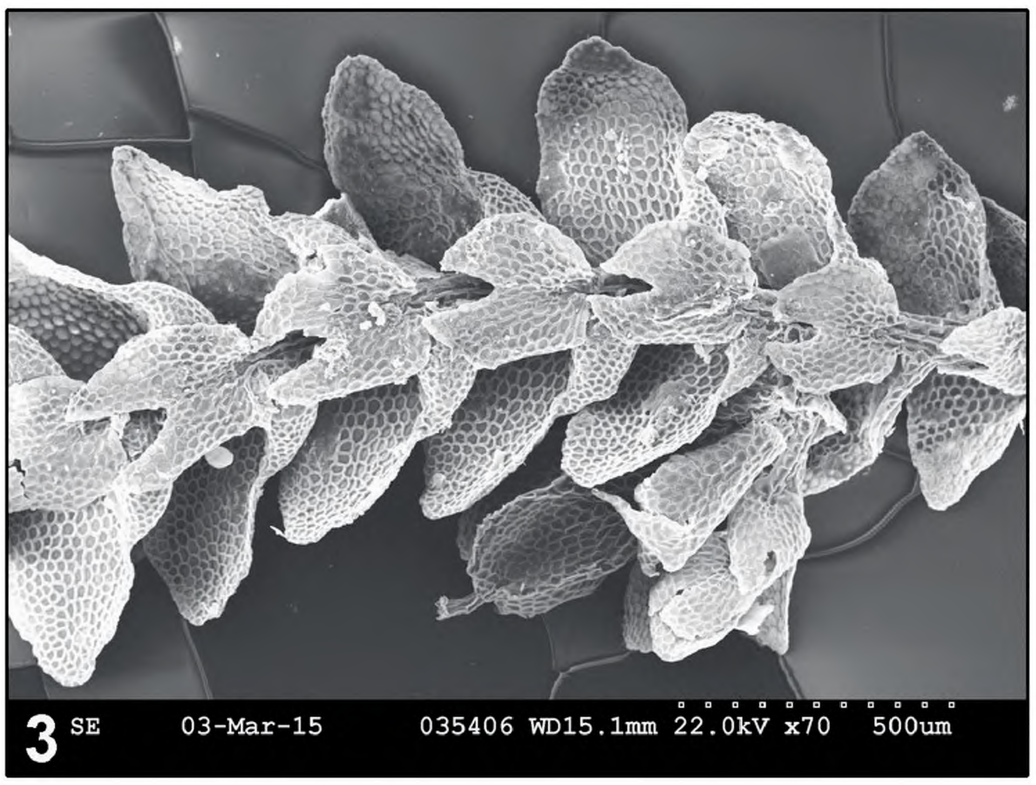
We did not come across or did not recognize this species in our collections. It seems to be an endemic of Fiji Islands.

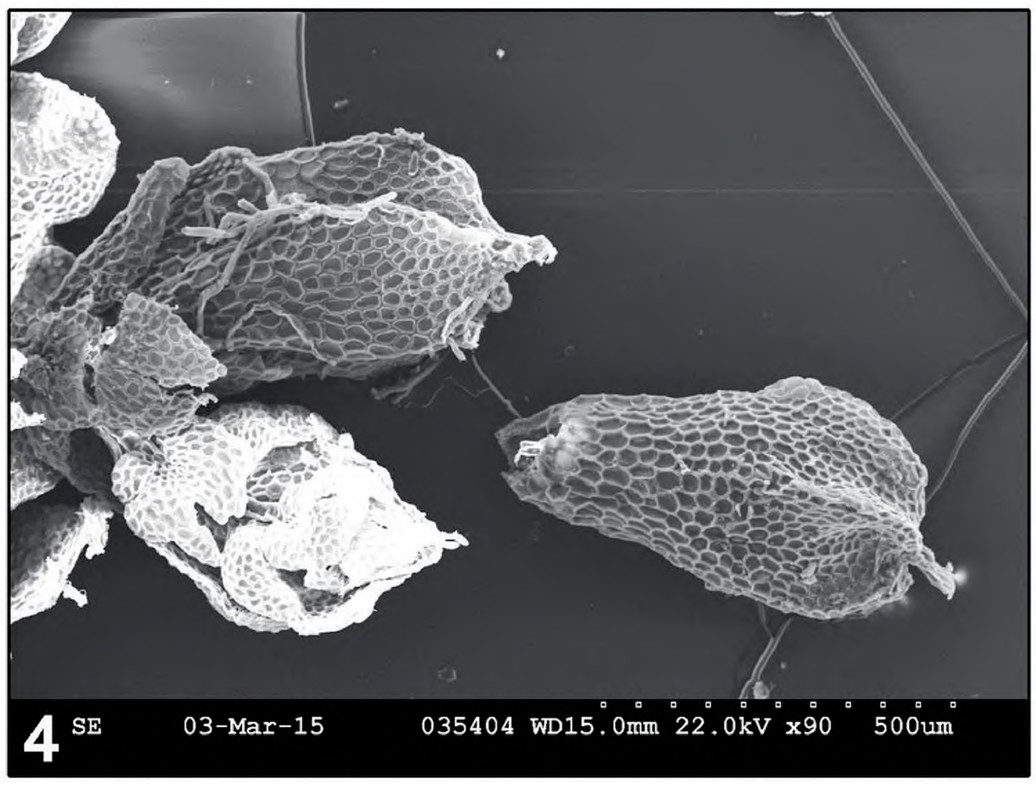
***Lejeunea discreta* Lindenberg in Gottsche et al., 1845** (Figs 3-4)

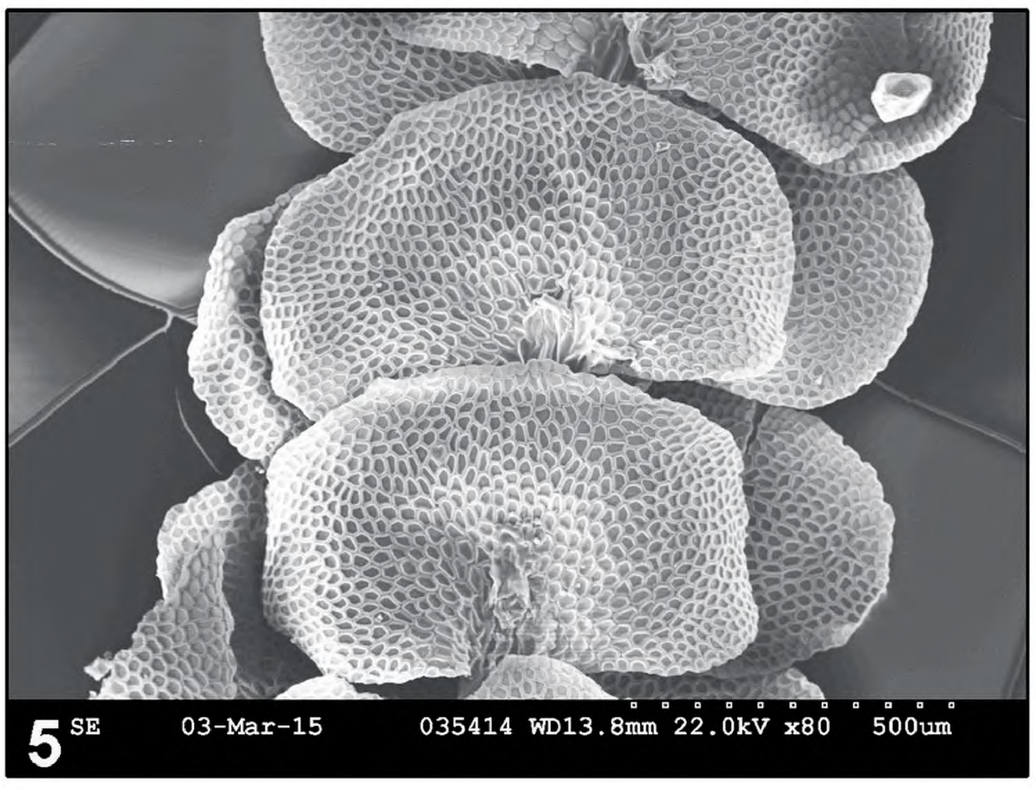
References: Hürlimann (1993: 10), VL; Söderström et al. (2011: 419); Pócs et al. (2011: 478), Ta.

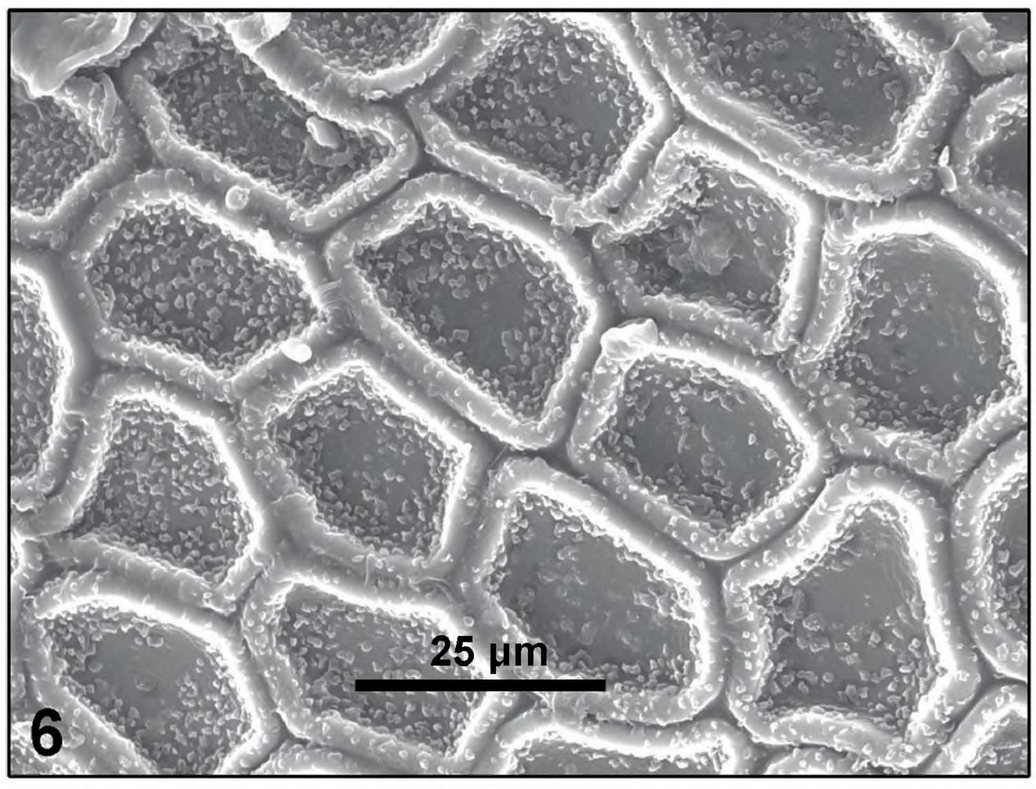












Figures 1-6. Fijian *Lejeunea* species. 1-2: *Lejeunea caviloba* (Steph.) Steph. from Pócs 03286/AU: 1 – Ventral view; 2 – Cuticle ornamentation; 3-4: *Lejeunea discreta* Lindenb. from Sass-Gyarmati 1177/D: 3 – Ventral view; 4 – perianths; 5-6: *Lejeunea mimula* Hürlimann from von Konrat 1179/C: 5 – Ventral view; 6 – Cuticle ornamentation.



New records: New to Ka: SW slopes of Mt. Delainabukalevu (Mt. Washington), cloud forest at 550-650 m, on bark. A. Sass-Gyarmati 1177/D, L. Söderström 2011/189. Altogether 12 records from 80 to 1265 m alt.
Illustrations: Mizutani (1970: 237, fig. VII); Zhu & So (2001: 145, fig. 56); Lee (2013: 418, figs 180-191).
Distribution: A widespread Indomalesian-Pacific species occurring also in Australia.

***Lejeunea eifrigii* Mizutani, 1970**
New records: New to Fiji Islands: Ta, NE slope of Des Voeux (Devo) Peak, in mossy elfin forest at 1040-1150 m, on other epiphytic bryophytes. S. & T. Pócs 03279/CK.
Illustrations: Zhu & So (2001: 133, fig. 51); Lee (2013: figs 192-204).
Distribution: A widespread tropical Asian species known from Java, Sumatra, Sabah, Luzon, Papua New Guinea, New Caledonia, China, Japan, India, (Pócs 1995; Zhu & So 2001; Dey et al. 2007).

Lejeunea exilis* (Reinwardt, Blume, Nees) Grolle, 1979** var. ***exilis
New records: New to Tonga Islands: on the volcanic island Tafahi, on bark of planted *Artocarpus incisa* tree along a forest road near Tafahi village, at 120 m alt. H. Hürlimann T 890 (Herb. Hürlimann).
References: Söderström et al. (2011: 419); Pócs et al (2011: 469), Ta, VL. New to Ka: Coastal ridge N of Vunisea, 40-80 m, on decaying bark in dry evergreen *Gymnostoma vitiense* (Casuarinaceae) forest. S. & T. Pócs 03303/H. Altogether 10 records from sea level to 1100 m alt.
Illustrations: Zhu & Grolle (2003: 103-104, figs 1-2); Lee (2013: 424, figs 205-224).
Distribution: It is an often overlooked, widespread Indomalesian-Australasian-Pacific species.

***Lejeunea exilis* var. *abnormis* (Herzog) G.E. Lee, 2013**
= *Byssolejeunea abnormis* Herzog, 1941
New records: New to Fiji Islands: Ta, along the road from Wairiki to Des Voeux Peak, at 715-750 m in montane rainforest, epiphyllous. S. & T. Pócs 03289/BY. SW part of the island, on foothills between Salialevu and Naqarawalu villages, in degraded rainforest at 100-200 m alt., on branches. S. & T. Pócs 03296/F p.p. VL: Coral Coast near Nabukawesi village in primary lowland rainforest at 30-60 m. S. & T. Pócs 03261/BY. Rairaimatuku Plateau 10 km SSE of Navai, epiphyllous and on the dead pseudostem of *Alpinia boia* (Zingiberaceae), 990-1010 m in mossy elfin forest. S. & T. Pócs 03274/AN and BQ. E spur of Delaitoga ridge along the Nabukavesi-Namosi road in cloud forest at 430 m. On *Alpinia boia* pseudostem. T. Pócs 1153/AU.
Illustrations: Lee (2013: 428, figs 225-235).
Distribution: The variety previously known only from Java and Peninsular Malaysia.

Lejeunea flava* (Swartz) Nees, 1838** ssp. ***flava
References: Hürlimann (1993: 10); Söderström et al. (2011: 419); Pócs et al. (2011: 478), Ov, Ta, VL.
New records: New to Ka: along Vunisea-Namara road at 110-150 m, on bark in mesic evergreen forest. T. Pócs 1171/T.
Illustrations: Lee (2013: 429, figs 236-249).
Distribution: Very widespread pantropical species, from Fiji Islands with 19 records, from sea level to 950 m.

***Lejeunea flava* ssp. *moorei* (Lindberg) R.M. Schuster, 1957**
New records: New to Fiji Islands: Vi, Rairaimatuku Plateau, elfin forest along the Monasavu-Nandrau road 10 km SSE of Navai, at 990 m alt., on twigs. A. Sass-Gyarmati 1164/T. According to Schuster (1957: 161; 1980: 967) and Jones (1968: 549) this taxon fully deserves its status.
Illustrations: Paton (1999: 496, fig. 244).
Distribution: Hitherto it was known only from Ireland, the Azores, Madeira and the Canary Islands (Lockhart et al., 2012). Its full distribution and taxonomic value has to be clarified.

***Lejeunea flavida* Mitten, 1861**
= *Lejeunea nietneri* (Stephani) Stephani ex Watts, 1902 (synonym according to Mizutani 1974)
References: Campbell (1971: 14); Miller et al. (1983: 180), VL.
Illustrations: Mizutani (1963: 173, fig. II, 1-9), as *Pycnolejeunea flavida* (Mitt.) Steph.
Distribution: Indomalesian-Pacific species, distributed from Sri Lanka to Samoa. According to Stephani (1915: 780) - 'valde communis'.
We did not come across this species in Fiji.

***Lejeunea gracilipes* (Taylor) Spruce, 1884**
= *Taxilejeunea gracilipes* (Taylor) Steph. 1914
References: Campbell (1971: 14), as *Taxilejeunea gracilipes* (Taylor) Steph. 1971: 26, Ta, Vi, Va.
Distribution: Southern Pacific species known from Fiji, Tahiti and Kermadec Islands (Miller et al. 1983), Samoa (Grolle 1980).



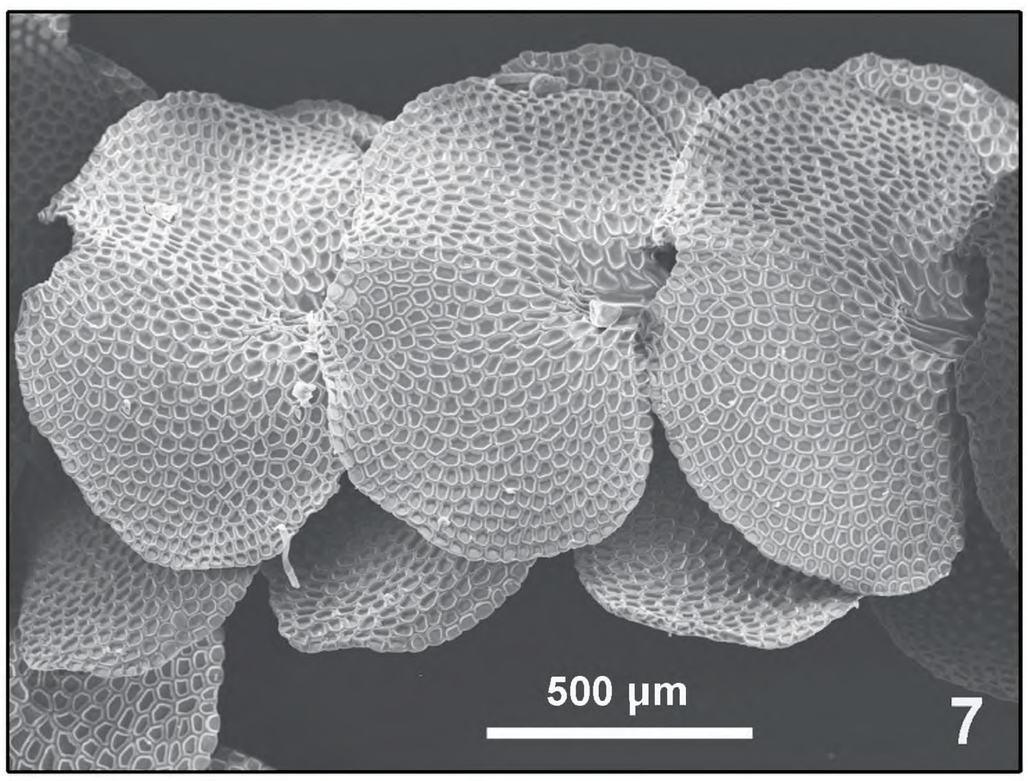


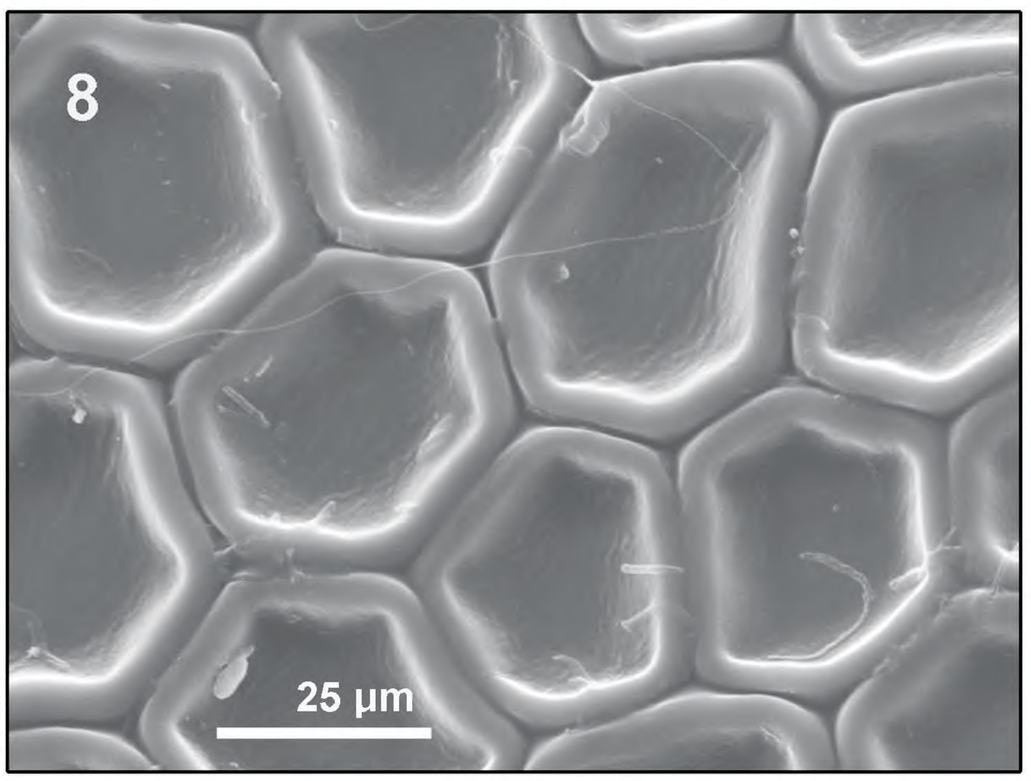

***Lejeunea lumbricoides* (Nees) Nees, 1845**

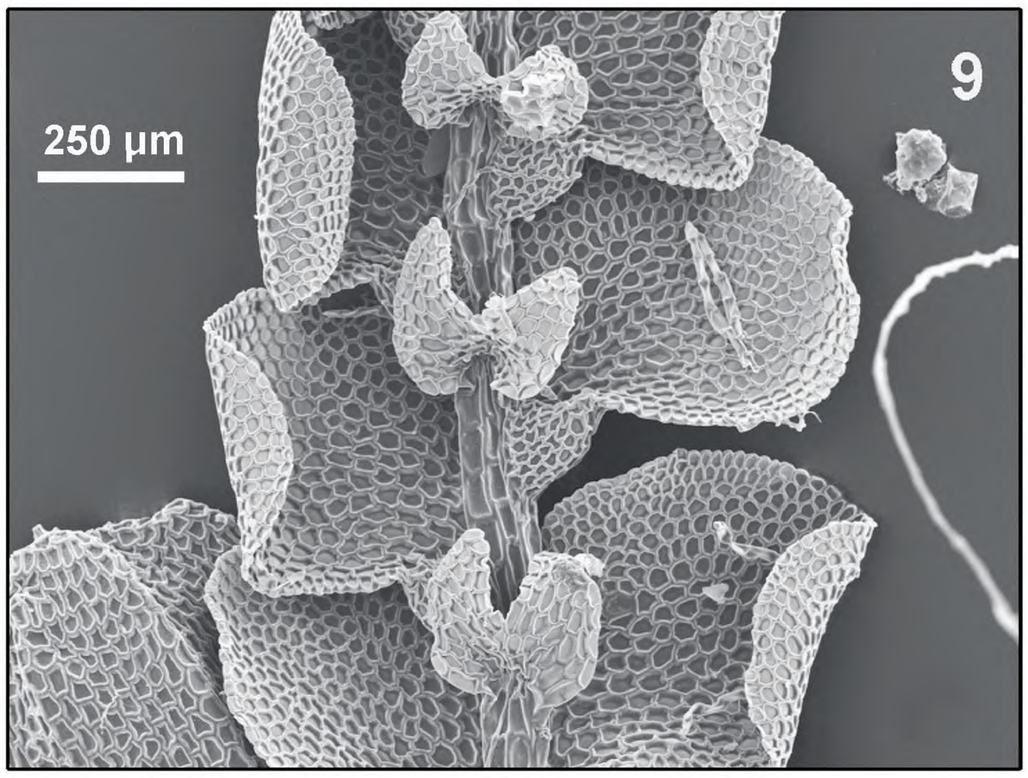
References: Stephani (1914: 561, as *Hygrolejeunea graeffeana*), Ov; Hürlimann (1993: 11); Söderström et al. (2011: 419); Lee (2013: 442); Vi, where we collected at 990 m alt. Altogether five records from the islands.

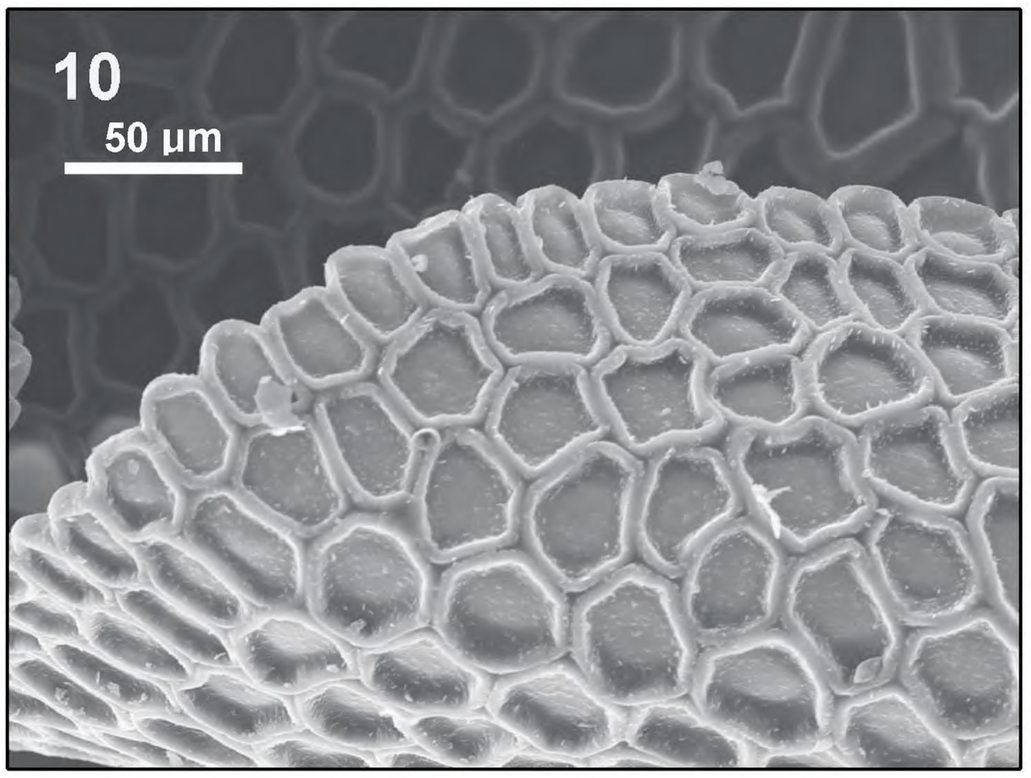
Illustrations: Mizutani (1970: 239, fig, VIII); Lee (2013: 441, figs 296-314).

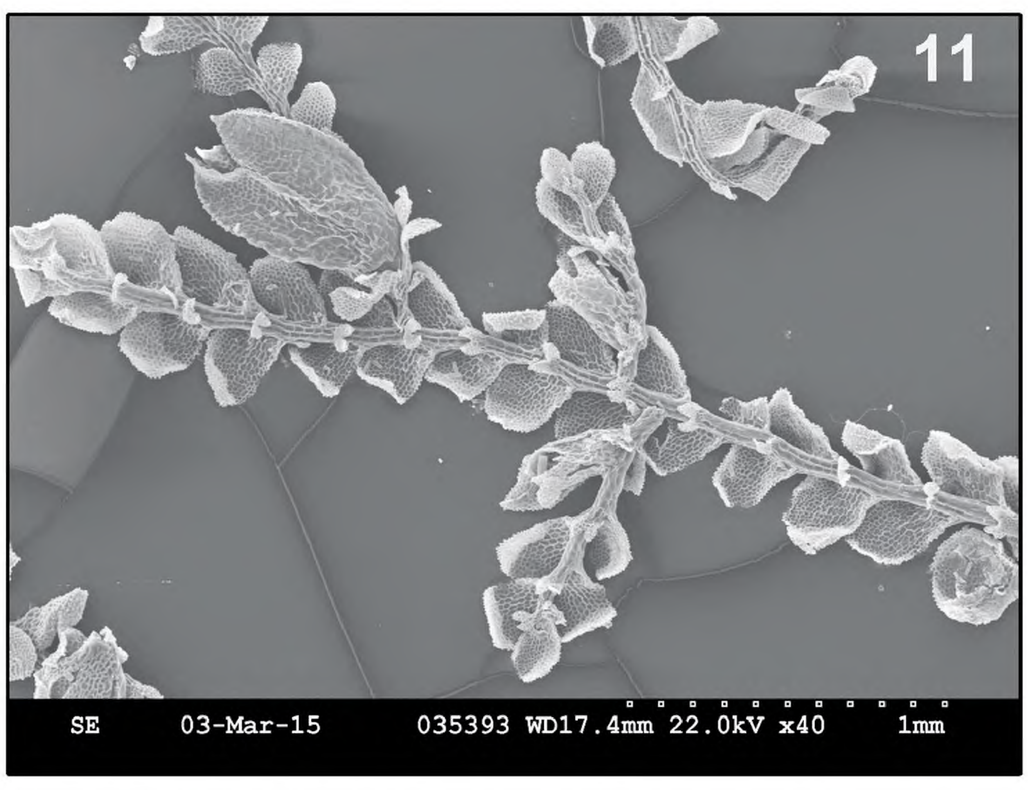
Distribution: A Malesian-Pacific species distributed from Java to Fiji, growing usually as hanging epiphyte in montane rainforests above 1000 m.

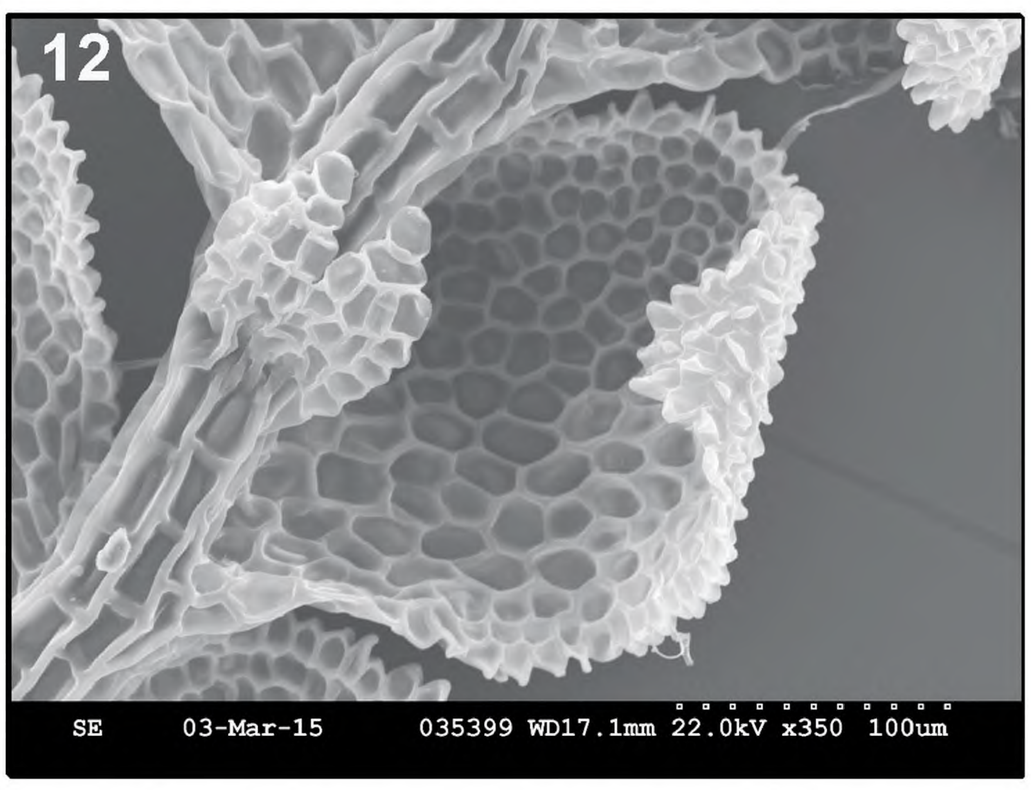












Figures 7-12. Fijian *Lejeuna* species. 7-8: *Lejeunea* cf. *sordida* (Nees) Nees aff. *L. leratii* (Steph.) Mizut. from Pócs 03285/L: 7 – Ventral view; 8 – Cuticle; 8-9: *Lejeunea patersonii* (Steph.) Steph. from Pócs 03282/AE; 8 – Ventral view; 9 – Marginal cells; 11-12: *Lejeunea reinerae* Ilkiu-Borges from Renner & Rakoro 5440 and from Söderström 2011/032: 11 – Renner & Takoro 5440; 12 – Söderström 2011/032.



***Lejeunea micholitzii* Mizutani, 1970**
References: Hürlimann (1993: 12), Vi; Söderström et al. (2011: 419); Pócs et al. (2011: 478), Ka, Ta. Altogether from 12 localities at 460-1010 m.
Illustrations: Mizutani (1970: 237, fig. VI); Lee (2013: 443, figs 315-333).
Distribution: Malesian-Pacific species known from Sri Lanka to the Philippines, Vanuatu and Fiji.

***Lejeunea mimula* Hürlimann, 1993** (Figs 5-6)
References: Hürlimann (1993: 12); Söderström et al. (2011: 419), VL.
New records: New to Ka: Mt. Delainabukelevu (Mt. Washington), cloud forest, 550-650 m, on bark and on leaves. A. Sass-Gyarmati 1177/AL, L. Söderström 2011/187; elfin forest 700-800 m, epiphyllous. M. von Konrat 1179/C. Altogether 16 records, most from Viti Levu Island at higher elevations.
Illustrations: Mizutani (1970: 242, fig. XI); Lee (2013: 449, figs 350-363).
Distribution: Malesian-Pacific species distributed from Java to Fiji.

***Lejeunea neelgherriana* Nees in Gottsche, Lindenberg et Nees, 1845**
New records: New to Fiji Islands: J. Larraín & M.A.M. Renner 36175. The only specimen was collected from the islands.
Illustrations: Zhu & So (2000: 150, fig. 1).
Distribution: Known from Sri Lanka, India, Nepal, Bhutan, Southern China, Korea and Japan (Zhu & So 2001).

***Lejeunea papilionacea* Prantl, 1892**
New records: New to Fiji Islands: Ta, SW part of the island, on foothills between Salialevu and Naqarawalu villages, in degraded rainforest at 100-200 m alt., on branches. S. & T. Pócs 03296/F p.p. Along the road from Wairiki village to Des Voeux peak, at 715-750 m, epiphyllous in mossy cloud forest. S. & T. Pócs 03289/BZ p.p. Around Tavoro Waterfalls, above Korovou village, at 10-100 m alt., on bark in wet lowland rainforest. S. & T. Pócs 03282/G. VL: at the N edge of Nausori Highlands, W of Bukuya village. On treefern petiole in submontane rainforest at 570 m alt. S. & T. Pócs 03253/J.
Illustrations: Jones (1972: 41, fig. 8 l-m, g-k); Zhu & Grolle (2001: 334, fig. 2); Lee (2013: 454, figs 379-393).
Distribution: A species of Palaeotropic distribution, known from West Africa and the East African islands through tropical Asia to Fiji (Wigginton 2009; Lee 2013).

***Lejeunea patersonii* (Stephani) Stephani 1915** (Figs 8-9)
References: Hürlimann (1993: 13); Söderström et al. (2011: 419), VL.
New records: New to Ta: NE side of Des Voeux (Devo) Peak, along the road from Vairiki village to the summit. Epiphyllous in mossy cloud forests at 715-1150 m alt. S. & T. Pócs 03279/BJ and BK; 03289/BZ p.p. Around Tavoro Waterfalls above Korovou village, at 10-100 m, in very wet lowland rainforest, on bark. S. & T. Pócs 03282/AE. Taveuni Estates above Saqulu village, on treefern stem in degraded submontane rainforest at 360 m alt. S. & T. Pócs 03290/J. Altogether 8 records from Fiji, from sea level to 750 m.
Illustrations: Lee (2013: 457, figs 394-410); Lee et al. (2014: 253, figs 21-29).
Distribution: Malesian-Pacific species distributed from Indochina to Tahiti (Lee 2013, 2014).
Notes: The record from Ovalau Island was based on the mistaken synonymy with *Microlejeunea samoana* Steph. in Miller et al. (1962), followed by Hürlimann and Söderström et al. (l.c.). Although Ovalau was considered to be a Samoan island by Stephani 1915, it really belongs to Fiji, as pointed out also by the above authors. *Microlejeunea samoana* is not synonymous with *Lejeunea patersonii*, but is a Fijian endemic species, as stated by Miller et al. (1962: 559), who studied its type. Only through further study it can be decided, whether it belongs to *Microlejeunea or Metalejeunea*.

***Lejeunea pulchriflora* (Pearson) G.E. Lee, Bechteler, Pócs, Schäfer-Verwimp et Heinrichs, 2016** (Figs 13-14)
= *Taxilejeunea pulchriflora* Pearson 1924, *Lejeunea tamaspocsii* G.E. Lee in Lee and Gradstein, 2013
New records: New to Fiji Islands: Ka, summit of Mt. Delainabukelevu (Mt. Washington), epiphyllous on Blechnum leaves in elfin woodland at 700-800 m alt. E.A. Brown & M. von Konrat 1178/T, 1179/C and E p.p.
Distribution: Distributed in the mountainous areas of tropical Africa, Malesia and the Pacific (see map in Lee et al. 2016).
Illustrations: Lee (2013: 470, figs. 477-492), as *L. tamaspocsii*; Lee et al. (2016: 15, fig. 1).

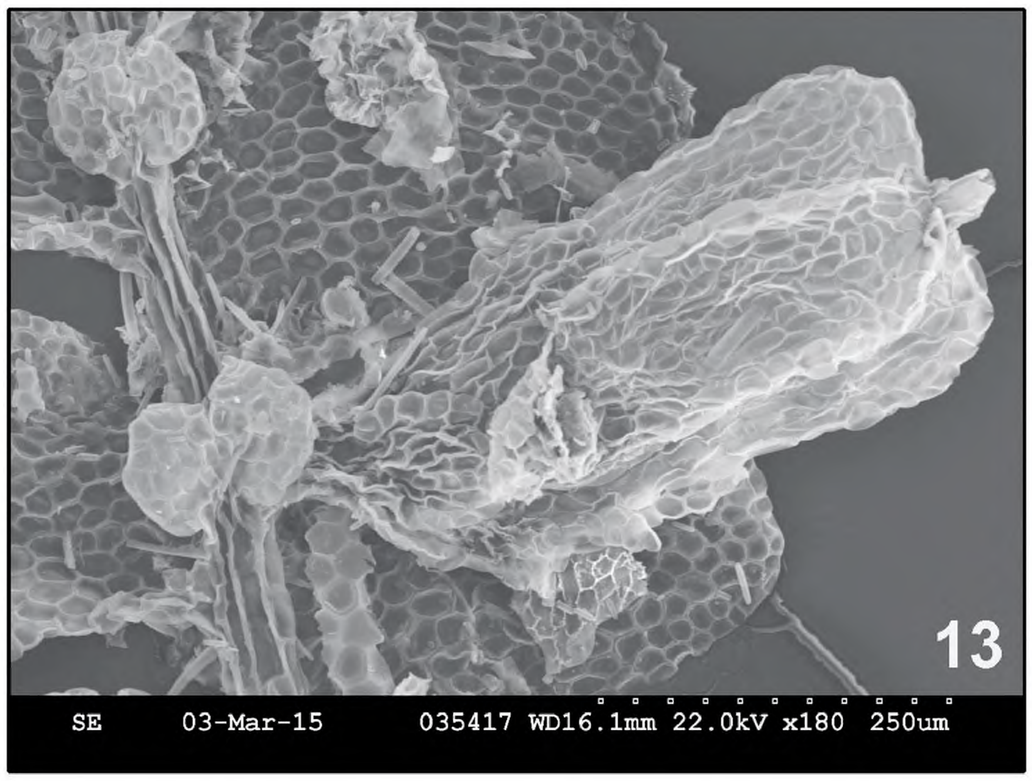


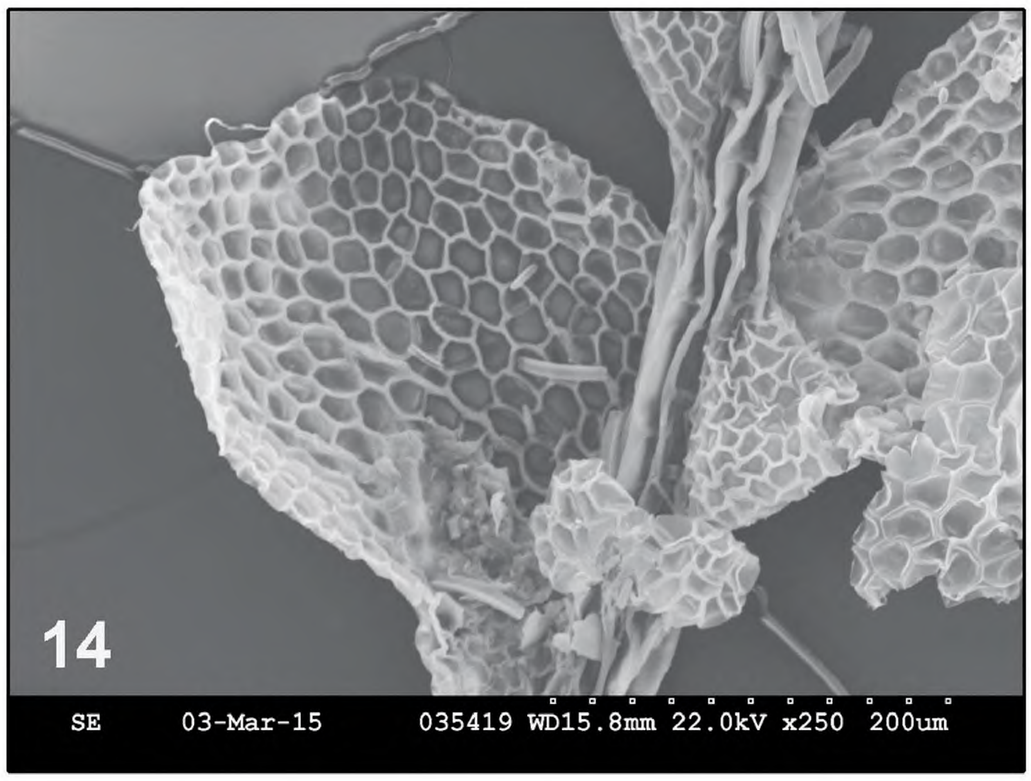


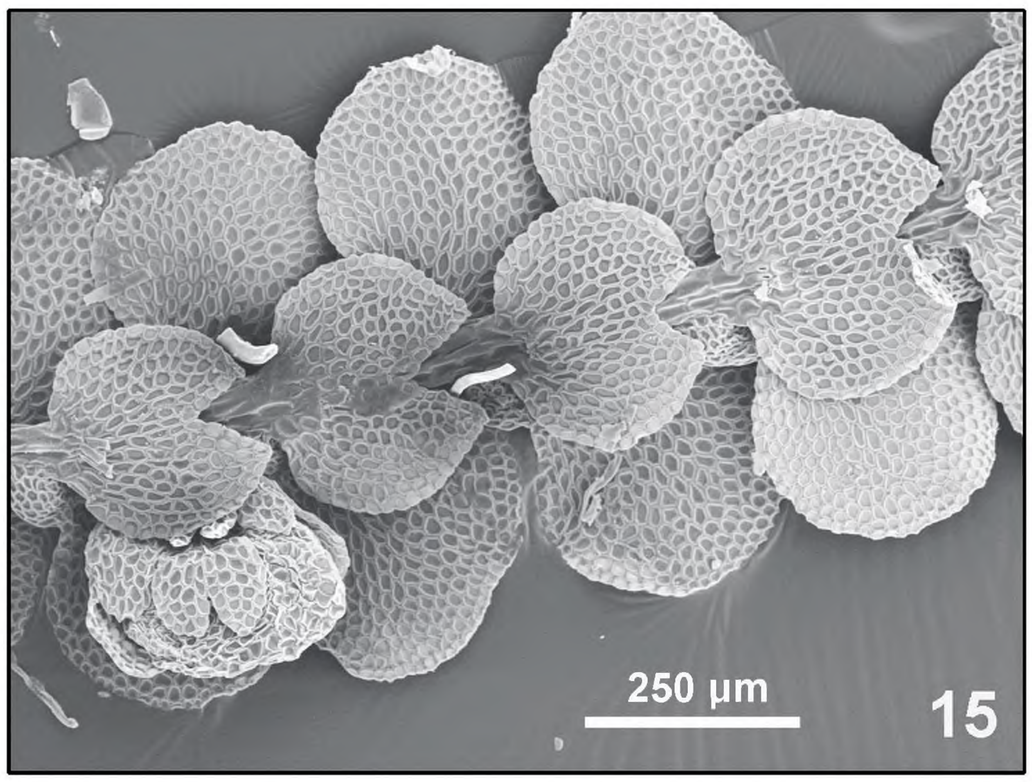

***Lejeunea reinerae* Ilkiu-Borges, 2005** (Figs 11-12)

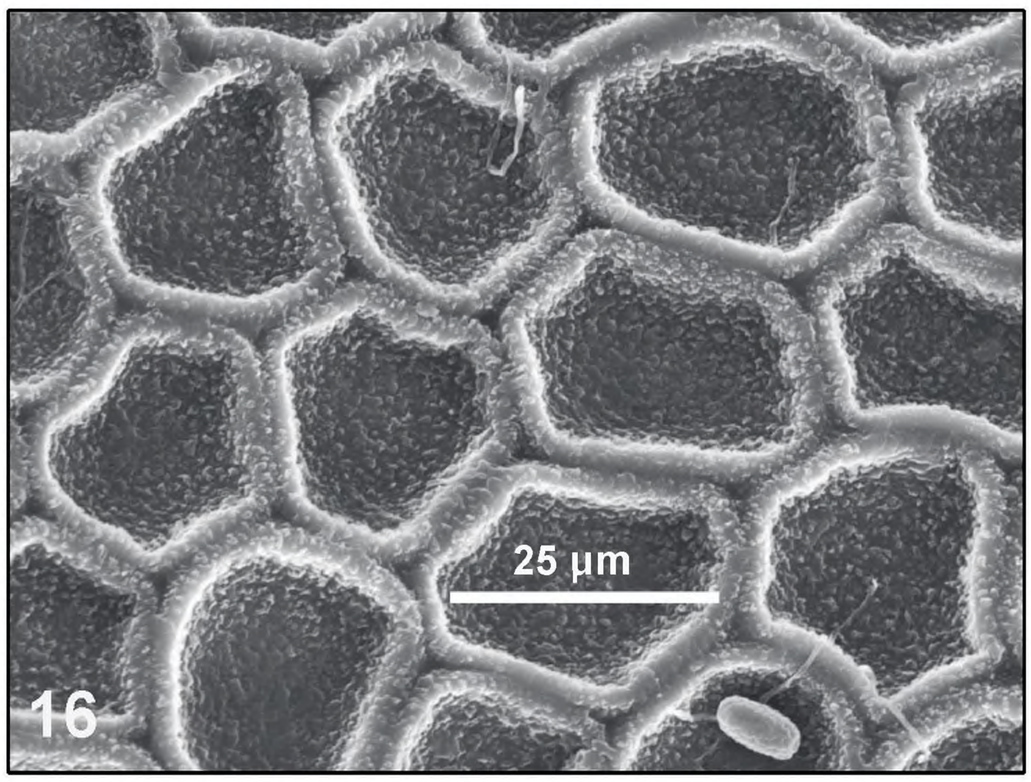
= *Echinocolea herzogii* Mizutani, Grolle, 1964.

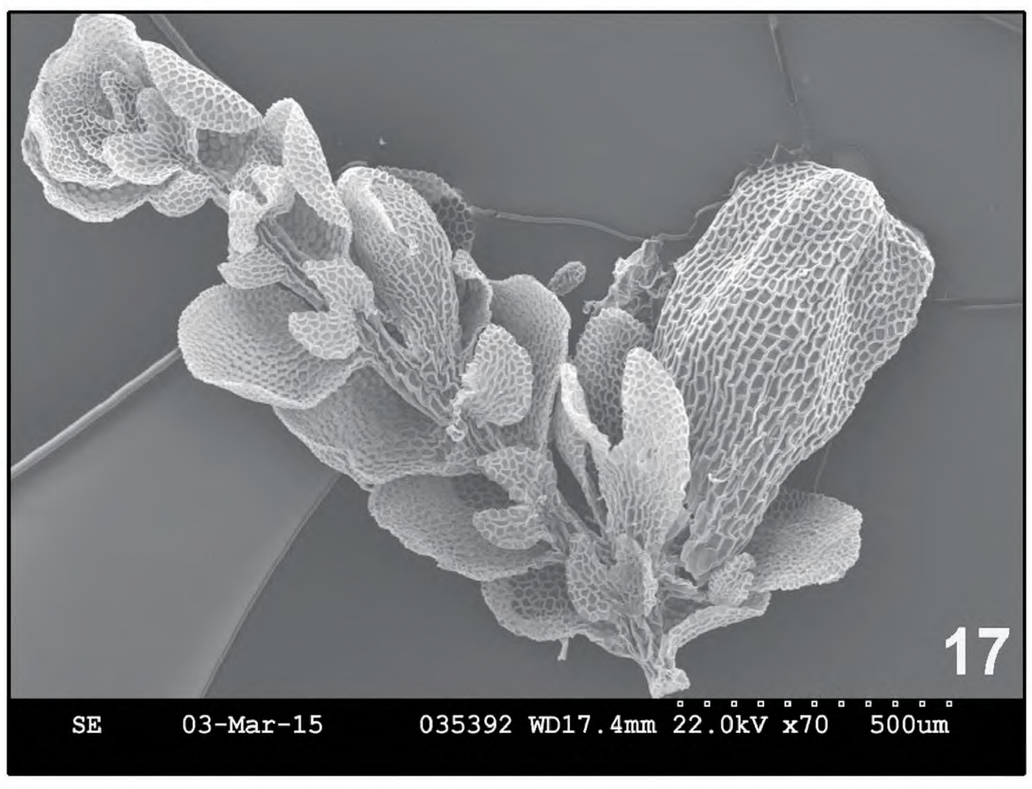
New records: New to Fiji Islands: Vi, Coral Coast near Nabukavesi village, 10 km N of Lombau. On emerged streambed rocks in wet lowland rainforest, 30-60 m. S. & T. Pócs 03261/AC. NE escarpment of Rairaimatuku Plateau, above Naqelewai village. On bark in a secondary submontane rainforest at 700 m. S. & T. Pócs 03272/C. E spur of Mt. Delaitoga ridge along the Nabukavesi-Namosi road. On bark in cloud forest at 430 m alt. A. Sass-Gyarmati 1153/AK. Sovi Basin, Waiamboa Stream above Nadakuni and Raravatu village, vicinity of Naimimilulu rock. On side of boulder on edge

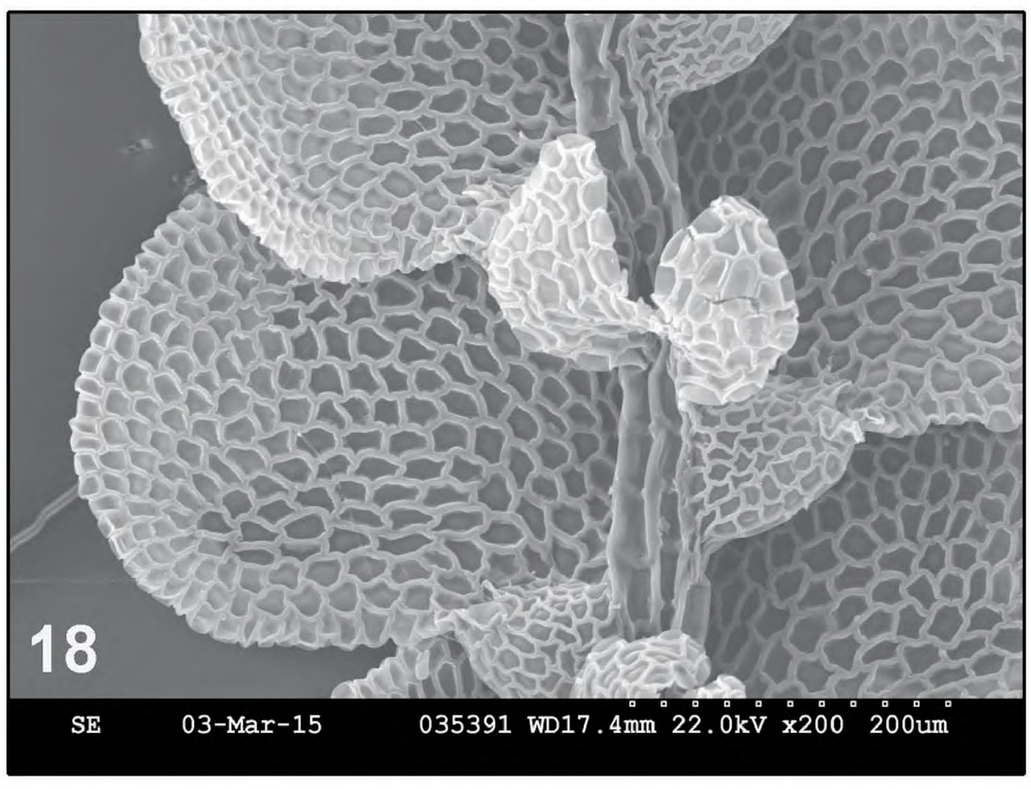












Figures 13-18. Fijian *Lejeunea* species. 13-14: *Lejeunea pulchriflora* (Pearson) G.E. Lee from Brown & von Konrat 1179/C: 13 – Perianth; 14 – Ventral view; 15-16: *Lejeunea sordida* (Nees) Nees from Pócs 03303/R: 15 – Ventral view; 16 – Cuticle ornamentation; 17-18: *Lejeunea umbilicata* (Nees) Nees from Pócs 03301/B: 17 – Habit with perianth; 18 – Ventral view.



of watercourse in riparian rainforest at 150 m. M.A.M. Renner & F. Rakoro 5440 (NSW 889642), L. Söderström 2011/032 and /040. Altogether 4 localities in Fiji, from sea level to 700 m.
Illustrations: Ilkiu-Borges (2005: 62, fig. 8).
Distribution: A Malesian-Pacific species previously known only from Sulawesi, New Britain and New Caledonia (Ilkiu-Borges 2005; Thouvenot et al. 2011).

***Lejeunea sordida* (Nees) Nees, 1838** (Figs 15-16)
References: Hürlimann (1993: 14), Vi; Söderström et al. (2011: 420); Pócs et al. (2011: 478) Ka, Ta.
Widespread in Fiji Islands on all substrates from sea level to 990 m alt., but mostly in lowland forests below 300 m. Altogether 39 localities from Fiji.
Illustrations: Mizutani (1970: 243, fig. XII); Zhu & So (2001: 142, fig. 55); Lee (2013: 465, figs. 446-462).
Distribution: Known as a Malesian-Pacific species distributed from Indonesia and China through the Philippines, Australia and New Guinea to Samoa and Micronesia (Zhu & So 2001; Lee 2013).
Notes: A smaller part of *Lejeunea sordida* specimens has very small incision on the underleaf apex, being in this respect transitional towards *Lejeunea mimula*. Eifrig (1937) in his monograph of *Taxilejeunea* described and illustrated a similar plant as *Taxilejeunea patersonii* (Steph.) Eifrig, mistakenly based it on *Lejeunea patersonii* (Steph.) Steph. instead of *Hygrolejeunea leratii* Steph. Mizutani (1970) clarified its position and described it as *Lejeunea leratii* (Steph.) Mizutani, based on *Hygrolejeunea patersonii*. Both Eifrig and Mizutani distinguish the plant from *Lejeunea mimula* by its female inflorescence usually with 1 subfloral innovation (instead of 2 in *L. mimula*) and by its short cylindrical beak of perianth (instead of funnel shaped in *L. mimula*). As these types of Fijian plants are sterile (and their cuticle is smooth), we classified this doubtful taxon within *L. sordida*, until fertile plants will be found (Figs 7-8).

***Lejeunea subigiensis* (Stephani) Stephani, 1896**
References: Campbell (1971: 15), Ov, VL.
New records: New to Ta: SSE coast, WSW of Navakawau village, epiphyllous in *Barringtonia asiatica* dominated coastal forest, at 8 m. S. & T. Pócs 03292/L. Altogether 5 records from the islands.
Distribution: Malesian-Pacific species occurring in Taiwan, Borneo, Philippines, Fiji and Samoa (Miller et al. 1983).
Notes: According to Zhu & So (2001: 159) it is extremely similar and not easily separated from *Lejeunea anisophylla* and the only difference is the presence of regenerants at the leaf margin of *Lejeunea subigiensis*.

***Lejeunea tuberculosa* Stephani, 1915**
New records: New to Fiji Islands: Vi, Naitasiri Distr., Ulvi Nakoba, vicinity of transmission station at summit, at 460 m alt. On bark at forest edge of mesophyll rainforest. M.A.M. Renner 5327 (NSW 889314). The only record is known from Fiji.
Illustrations: Mizutani (1971: 452); Jones (1972: 34), as *Lejeunea camerunensis* Stephani; Lee (2013: 473).
Distribution: Widespread Palaeotropical species distributed throughout tropical Africa, Asia and the Pacific (Lee 2013: 475).

***Lejeunea umbilicata* (Nees) Nees in Gottsche, Lindenberg et Nees, 1843** (Figs 17-18)
= *Lejeunea cuculliflora* (Stephani) Mizutani, 1970
References: Jack & Stephani (1894), Eifrig (1937) as *Taxilejeunea umbilicata* (Nees) Spruce, OV; Jack & Stephani (1894), as *Taxilejeunea umbilicata*, Vi; Södersdtröm et al. (2011: 420); Pócs et al. (2011: 479), TA.
New records: New to Ka: 2-3 km NNE of Vunisea, along Namara road on rocks below waterfall, at 100-150 m alt. S. & T. Pócs 03301/BJ. Altogether 17 localities in Fiji Islands on different substrates, from 10-1150 m alt.
Illustrations: Mizutani (1970: 235); Lee (2013: 476).
Distribution: Malesian-Pacific species distributed from Sumatra to the Philippines and Samoa.

***Lejeunea* sp. nov. 1**
A species with pluricellular first tooth. Only known from the type, growing on half woody *Piper* stem: Vi, Rairaimatuku Plateau, 855-945 m alt.
Seems to be endemic of Fiji Islands.

***Lejeunea* sp. nov. 2**
A species with eplicate perianth. Only known from Fiji, growing as epiphyllous and ramicolous in montane rainforest and mossy (cloud) forest, Ta, Vi, 600-950 m alt.
Seems to be endemic of Fiji Islands.






Phytogeographical evaluation

Interestingly the distribution pattern of the species of Fijian *Lejeunea* Libert (1820) is quite different from the distribution pattern of the species of *Cololejeunea* (Spruce) Stephani (1891) of the same islands (Pócs 2012). The proportion of the widely distributed multicontinental pantropical elements is much lower in *Lejeunea* than in *Cololejeunea* (4 vs 16%). The explanation might be in the presence of commonly developing discoid gemmae in *Cololejeunea*, probably suitable also for long range air dispersal. On the other hand, the ratio of Malesian-Pacific species is higher in *Lejeunea* (33 vs 7%), what probably can be explained by step by step dispersal in this genus more pronounced than long range air dispersal. The other explanation should be the different age of the genera (Wilson et al. 2007; Feldberg et al. 2014), but in this case the older (Palaeocene) *Lejeunea* species should be more widespread than *Cololejeunea* of Oligocene origin, adapted later to the epiphyllous life style.

The above relationships appear in the list and diagram below (Fig. 19):

- Fijian endemics – 3 species: *Lejeunea crassiretis, L.* sp. nov. 1, *L.* sp. nov. 2.
- Southern Pacific – 2 species: *Lejeunea caviloba, L. gracilipes.*
- Malesian-Pacific – 9 species: *Lejeunea eifrigii, L. lumbricoides, L. micholitzii, L. mimula, L. patersonii, L. reinerae, L. sordida, L. subigiensis, L. umbilicata.*
- Indomalesian-Pacific – 6 species: *Lejeunea apiculata, L. cocoes, L. discreta, L. exilis, L. neelgherriana, L. flavida*
- Southeast-Asian – 1 species: *Lejeunea compacta.*
- Palaeotropical – 5 species: *Lejeunea alata, L. anisophylla, L. papilionacea, L. pulchriflora, L. tuberculosa.*
- Pantropical – 1 species: *Lejeunea flava.*

Acknowledgements

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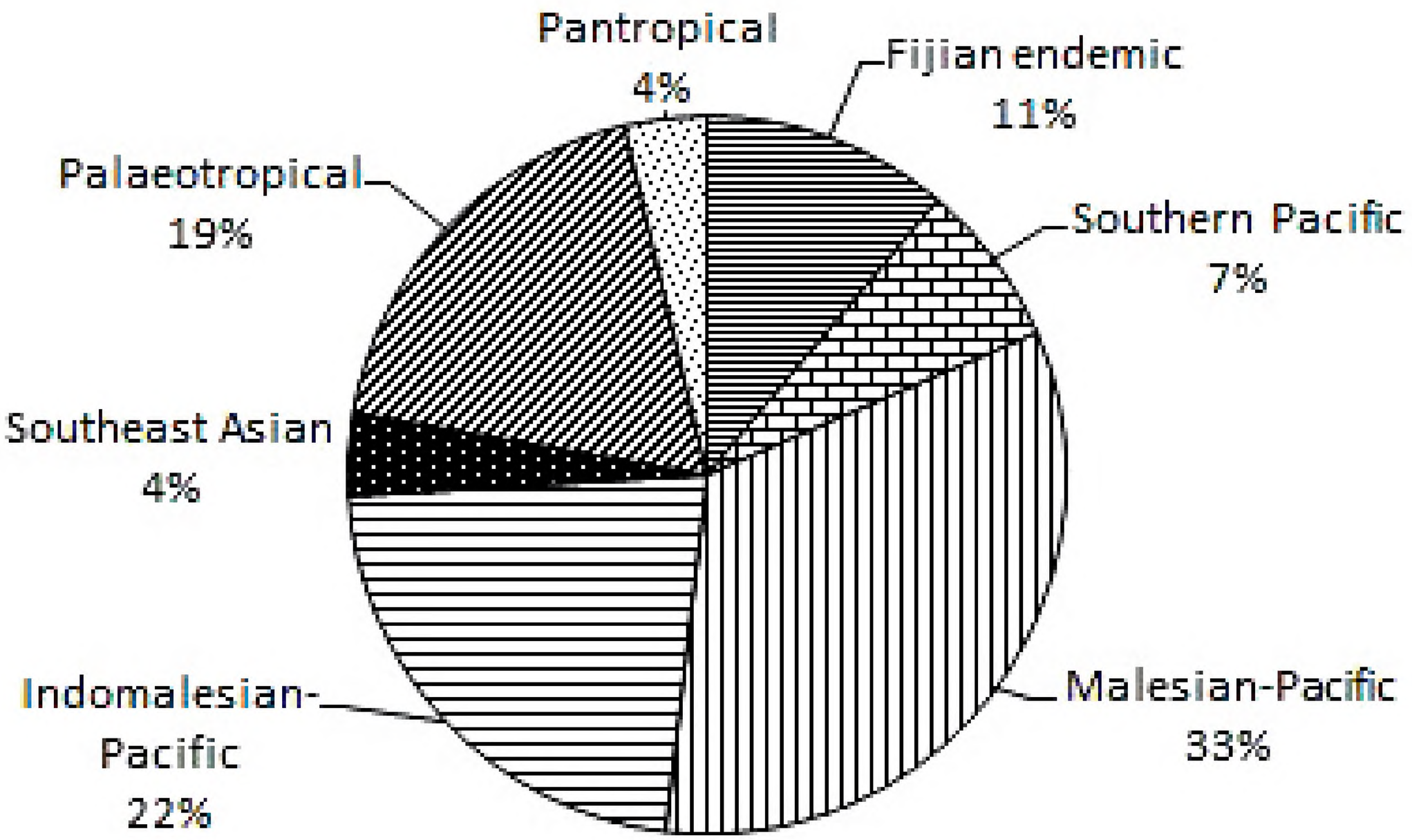


Figure 19. Distribution types of Fijian *Lejeunea* Libert (1820) species.



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The identity of *Lygosoma (Hinulia) misolense* Vogt, 1928 (Squamata: Scincidae)

GLENN M. SHEA

Sydney School of Veterinary Science, B01, University of Sydney, NSW 2006, Australia *and* Australian Museum Research Institute, 1 William St., Sydney, NSW 2010, Australia; e-mail: glenn.shea@sydney.edu.au

Abstract: *Lygosoma* (*Hinulia*) *misolense* Vogt, 1928, described from Misool Island, is redescribed from the two type specimens, and shown to be a junior synonym of the widespread species *Sphenomorphus simus* (Sauvage, 1879). A lectotype is designated, and an extended synonymy provided.

Key Words: Scincidae, *Sphenomorphus simus*, taxonomy, Misool Island.

Introduction

Theodor Vogt (1928) described *Lygosoma misolense* from two specimens found among a small collection of lizards made on Misool Island by the ethnologist Odo Deodatus Tauern (14.xi.1885, New York – Freiburg im Breisgau, 11.vii.1926), and donated through Hermann Stitz (24.xii.1868 - 6.ii.1947) to the Zoologischen Museum, Berlin (ZMB, now part of the Museum für Naturkunde, Berlin). The species has received scant attention since. It was listed as a distinct species of *Lygosoma* by Brongersma (1933) and, with the division of that genus by Mittleman (1952), it was listed as a distinct species of *Sphenomorphus* by Greer and Parker (1967, 1971), Linkem et al. (2010) and Hedges (2014). Loveridge (1948) considered it a synonym of *Lygosoma* (*Sphenomorphus*) *variegatum jobiense* (originally described by Meyer, 1874 as *Lygosoma* (*Hinulia*) *jobiense*) but Loveridge's nomenclature has since been shown to be incorrect, with the two subspecies he referred to as *Lygosoma* (*Sphenomorphus*) *variegatum jobiense* and *Lygosoma* (*Sphenomorphus*) *variegatum stickeli* later shown to be a single species distinct from *Sphenomorphus variegatus* Peters, 1867 of the Philippines, initially *Sphenomorphus melanopleurus* Inger, 1958, then *Sphenomorphus stickeli* (Loveridge, 1948) by Inger (1961), and more recently, *S. simus* (Sauvage, 1879) by Shea and Greer (1999), while the name *jobiensis* was instead applicable to the species Loveridge had referred to as *Lygosoma* (*Sphenomorphus*) *megaspila* (Günther, 1877). None of these authors examined the types of *L. misolense*, which were first identified by Bauer et al. (2003) as ZMB 31523. Bauer *et al*. recommended that *Lygosoma misolense* be retained as a distinct taxon within *Sphenomorphus* pending examination of the syntypes. In this paper, I complete this task.

Materials and methods

The two syntypes of *Lygosoma misolense* (Plate 1 figs 1-2) are now ZMB 31523 and 64387, following re-registration of the smaller specimen. In redescribing the two syntypes, I adopt the head shield nomenclature of Taylor (1935), with the addition of the concept of subloreals, the single row of flattened scales separating loreals from supralabials in this species. Midbody scales are counted at the mid-point of the axilla-groin interval; paravertebral scales are counted on the left side of the midline from the first scale posterior to the parietals to the last scale anterior to the level of the hind limbs, with limbs held at right angles to the body; subdigital scales are counted on the fourth toe from the base of the crease between third and fourth toes, to and including the terminal sheathing scale at the base of the claw (this includes the terminal end of the metatarsal, which is incorporated into the base of the digit in this species).

Measurements were made with the structure held straight against a steel rule, or (for head measurements) with dial callipers, both sets of measurements taken with the instrument examined






under a dissecting microscope to ensure correct placement. Head measurements are to the nearest 0.1 mm; other measurements are to the nearest 0.5 mm. Snout-vent length (SVL) is from tip of snout to posterior edge of median precloacal scales, along the ventral surface; axilla-groin length (AGL) is from the posterior junction between forelimb and body wall, to the anterior junction between hindlimb and body wall, with the limbs held at right angles to the body axis; forelimb length (FLL) and hindlimb length (HLL) are from the medial extremity of the posterior crease between limb and body wall, to the tip of the claw, with the limb held at right angles to the body; head length (HL) is from the tip of the snout obliquely to the anteriormost margin of the external ear aperture; head width (HW) is at the widest point of the head, and head depth (HD) is at the deepest point of the head over the parietal table, including the lower jaw, at right angles to the labial margin.

Redescription of the syntypes of *Lygosoma misolense*

Vogt's (1928) description of the species was limited, although typical of the descriptions of that era. Vogt compared his new species only to *S. striolatus* (Weber, 1890), a species described from Flores in the Lesser Sundas, noting in particular unspecified differences in coloration, a lower number of subdigital lamellae, shorter limbs, and smooth, non-striate dorsal scales. To aid in discussion of the identity of this species, I provide a more extended description of the two syntypes, with the character states for ZMB 31523 first.

Snout short and blunt; rostral in broad contact with frontonasal, the suture straight; prefrontals in broad contact; supraoculars seven, the first three in contact with the frontal; frontoparietals paired; parietals in broad contact behind interparietal; nostril in centre of nasal; supranasals and postnasals absent; loreals two, separated by a long low subloreal (first of the series of sublorealis) from the supralabials; suboculars 1-2 (1L/2R, 2L/2R); postsuboculars 6-7 (6L/6R, 7L/6R), lowermost not interdigitating with supralabials; supraciliaries 14-15 (15L/14R, 16L/15R), last few interdigitating with posterior supraoculars; supralabials 7-8 (7L/7R, 8L/7R), fifth (n = 3) or sixth (n=1) under centre of eye; last two supralabials each divided into an upper and a lower scale; primary temporals two; secondary temporals two, lower overlapping upper; postmental contacting a single infralabial on each side; three pairs of chin shields, first pair in contact medially, second pair separated by a single median scale, third pair separated by three median scales, all laterally contacting infralabials.

Midbody scales 38, 42; paravertebral scales 66, 61; subdigital scales below fourth toe 24-28 (24L/25R, 28L/27R), basalmost paired, imbricate, over distal section of metatarsal, remainder undivided and keeled; terminal two scales above fourth toe undivided; imbricate scales on dorsum of pes extending ventrally between fourth and fifth digits onto sole, without a sharp disjunction from the solar granules on anterior part of sole; preanals enlarged, median pair overlapping lateral scales. Dorsal and lateral scales finely granular, more so laterally.

Raw measurements of the two syntypes are provided in Table 1 (see Appendix). Proportions from these measurements are: AGL/SVL 42.9%, 42.5%; FLL/SVL 34.1%, 37.0%; HLL/SVL 57.1%, 61.6%; HLL/AGL 133.3%, 145.2%; HL/SVL 22.9%, 26.6%; HW/SVL 17.4%, 17.0%; HW/HL 76.0%, 63.9%; HD/SVL 13.4%, 13.7%, HD/HL 58.7%, 51.5%. Neither specimen has a complete, unregenerated tail, although that of 31523 is only missing the tip; the proportion of remaining tail length/SVL is 156.0%.

Discussion

In a few aspects, Vogt's description differs significantly from my examination of the two syntypes. In particular, he reported 11 supraciliaries, and 22 lamellae under the fourth toe. These are likely to reflect differences in definitions of the characters. However, it is unclear what character definitions Vogt used. In other character states, for example number of supralabials (7) and midbody scales (42), Vogt reports no variation, although there is variation between the syntypes. In two other character states given by Vogt (subdigital lamellae not keeled; dorsal scales smooth, lateral scales with pore-like, fine depressions), my examination of the syntypes is not in agreement with his description. There are no pores on the scales – instead the dorsal and lateral scales bear numerous fine tuberosities (Plate 1 fig. 3), although these are less pronounced on the dorsal scales than laterally. Vogt may have been misled by the limitations of the optical resolution of his microscope.

With the redescription of the syntypes of *Lygosoma misolense*, it is now clear that this species is synonymous with *Sphenomorphus simus* (Sauvage, 1879). The coloration (Plate 1 figs 1-2) falls within the range of variation of *S. simus*, and the






presence of a subloreal row, a single row of keeled subdigital lamellae, imbricate scales extending onto the solar surface of the pes, seven supraoculars with the first three contacting the frontal, and small granules on dorsal and lateral scales are all characteristics of *S. simus*. The number of midbody scales (38-42) is within the range of variation of *S. simus* (38-44, mean = 40.1, n = 27, Inger, 1961; 38-45, n = 138 from the Sepik region and adjacent islands, and 37-49, n = 23 from the Bismark Archipelago, Mys, 1988; 37-47, mean = 40.8, mode = 40 (34%), n = 106, pers. obs.), as are the number of paravertebral scales (61-66 *vs* 59-72, mean = 64.2, median = 64, n = 108, pers. obs.) and subdigital scales (24-28 *vs* 20-30, mean = 25.1, mode = 25 (21%), n = 89, pers. obs.).

Only in the number of supralabials does *L. misolense* seemingly differ from *S. simus*. Inger (1958, 1961) considered *S. simus* (as *S. melanopleurus* and *S. stickeli*) to differ from *S. variegatus* of the Philippines in usually having 8 supralabials *vs* 7 supralabials, while Vogt (1928) reported *L. misolense* to have 7 supralabials. However, my examination of a larger sample of *S. simus*, covering a wider area than seen by Inger (1958, 1961), effaces the difference. Among 209 individuals of *S. simus*, although the mode was bilaterally 8 (n = 120, 57%), over a third had bilaterally 7 (n = 42, 20%) or asymmetrically 7/8 (n = 39, 19%), with the small residue asymmetrically 8/9 (n = 8, 4%). Further, the smaller syntype of *S. simus* is also asymmetrically 7/8.

Sphenomorphus simus is widespread in New Guinea, and reaches a number of island groups, including New Britain, New Ireland and New Hanover in the Bismark Archipelago and Kairiru, Karkar and Muschu along the Sepik coastline (Mys 1988), and Numfoor [formerly Mafor] and Yapen [formerly Japen] in Cenderawasih [formerly Geelvink] Bay (Sauvage 1879; Inger 1961. De Rooij (1915) reported it, as *S. variegatus*, from Biak [formerly Mysore] and Roon [formerly Ron] in Cenderawasih Bay and the Aru Islands, but did not record examining specimens to confirm the localities. Her records appear to be based on the earlier records of *Lygosoma naevium* (Gray, 1845) from these localities by Peters and Doria (1878), which remain to be confirmed as *S. simus*. The species also occurs in the northern Raja Ampat group (AMNH 94314-40, Batanta Island), and hence its occurrence on Misool, the southernmost of the larger islands in the Raja Ampat group is not unexpected.

With the addition of *L. misolense*, the already lengthy synonymy of this widespread and common species gains one more name:

Sphenomorphus simus (Sauvage, 1879)

Lygosoma (Hinulia) sima – Sauvage, 1879: 54. Lectotype MNHN 1996.1114, designation by Shea & Greer 1999.
Type locality: Ile Mafor [= Namfoor I.]

= *Hinulia naevia* (part) – Gray 1845 (non *Scincus naevius* Duméril & Bibron 1839).

= *Lygosoma* (*Hinulia*) *variegatum* (part) – Boulenger 1887 (non *Lygosoma (Hinulia) variegatum* Peters 1867).

= *Lygosoma* (*Hinulia*) *misolense* – Vogt 1928: 334. Lectotype: ZMB 31523, here designated. Type locality: Misol [= Misool Island, Indonesia].

= *Lygosoma totocarinatum* – Vogt, 1932: 286. Holotype: ZMB 25768. Type locality: [Sepik River, Papua New Guinea, fide Shea & Greer 1999].

= *Otosaurus simum* – Smith 1937.

= *Otosaurus variegatum* (part) – Smith 1937. (non *Lygosoma* (*Hinulia*) *variegatum* Peters 1867).

= *Lygosoma* (*Sphenomorphus*) *variegatus stickeli* – Loveridge 1948: 345. Holotype: MCZ 49326. Type locality: Gusiko [Morobe Province, Papua New Guinea].

= *Lygosoma* (*Sphenomorphus*) *variegatus jobiense* – Loveridge 1948 (non *Lygosoma (Hinulia) variegatum* Peters 1867, non *Lygosoma (Hinulia) jobiensis* Meyer 1874).

= *Lygosoma* (*Sphenomorphus*) *simum* – Loveridge 1948.

= *Sphenomorphus simus* – Mittleman 1952.

= *Sphenomorphus stickeli* – Mittleman 1952.

= *Sphenomorphus totocarinatus* – Mittleman 1952.

= *Sphenomorphus melanopleurus* – Inger 1958: 264. Holotype: FMNH 78383. Type locality: Marienberg, Sepik River [East Sepik Province, Papua New Guinea].

= *Sphenomorphus stickeli stickeli* – Inger 1961.

= *Sphenomorphus stickeli melanopleurus* – Inger 1961.

= *Sphenomorphus misolensis* – Bauer et al. 2003.

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Appendix:

Specimens examined (collection abbreviations follow Leviton et al. 1985):

Sphenomorphus simus (Sauvage, 1879)
AMNH: 58396-401, Tarara, Western Province, PNG; 61810, 61952-55, 66349-53, 105880, Hollandia [Jayapura], Papua Province, Indonesia, 62444-46, Bernhard Camp, Idenburg River, Papua Province, Indonesia; 66691, 95622, 1 mi. N Bonga, Huon Peninsula, Morobe Province, PNG; 82379, probably New Britain, PNG; 94314-40, Mt Besar, above Wailebet, Batanta I., West Papua Province, Indonesia; 95502, Maprik, East Sepik Province, PNG; 95861, Masba Creek, Morobe Province, PNG; 100327-28, Miliom, Sandaun Province, PNG; 100329-33, Lumi, Sandaun Province, PNG; 102237-41, Uraru, Purari River, Gulf Province, PNG; 102242, Soliabedo, Simbu Province, PNG; 102242-43, Camp II, Pio River, Gulf Province, PNG; 103969-70, Daru I., Western Province, PNG; 103971-73, Derongo, Western Province, PNG; 105858, Nobonob, 3 mi. W, 4 mi. N Madang, Madang Province, PNG; 105859-60, Talasea, West New Britain Province, PNG; 109524-29, Gusika, Huon Peninsula, 18 km N Finschhafen, Morobe Province; 111736-40, Emeti, Western Province, PNG; 134061-62, 134064-65, Haidauwogam Village, 27 km S, 5 km E Tabubil, Western Province, PNG.
AMS: R15392-94, Haia Bush Camp, Simbu Province, PNG; R129616, 6 km NNE Amelei, West New Britain Province, PNG; R129620-21, Awit River, SSW Waitpo Village, East New Britain Province, PNG; R129653, Waitpo Village, East New Britain Province, PNG; R135544, 135547, 135549, 135554, Mt Sue, Sandaun Province, PNG.
BPBM: 11922, Weitin River Valley, 13 km N, 10.5 km W of river mouth, New Ireland Province, PNG; 11969, 11974, Lake Camp, 1778 m, Hans Meyer Range, New Ireland Province, PNG; 12039, 12059-61, 12063, 12067-69, 12084, 12095, Weitin River Valley, 8 km N, 7 km W of river mouth, New Ireland Province, PNG; 13117, 13138-41, 13150, Avi Avi River, E branch, 5.5 km S, 5.6 km W Tekadu Airstrip, Ivimka Field Station, Gulf Province, PNG; 43231-33, 43248, 43250, 43251-52, 43256, 43257, AA field series 14788-89, 14799, 14885, 14887, 14889-92, 14919-20, 14923, Kuala Kencana (near sewage plant), *ca* 15.5 km (by air) NNW Timika airport, Papua Province, Indonesia; 43234, 43235-37, 43238, 43239-40, 43241-43, 43244, 43246, 43247, AA field series 14726, 14940, Kuala Kencana Light Industry Park, ca 10 km (by air) N of Timika airport, Papua Province, Indonesia; 43253, *ca* 23 km (by air) NNE of Timika airport, Papua Province, Indonesia; 43254, 43269, AA field series 15342, *ca* 27.5 km (by air) NNE Timika airport, Papua Province, Indonesia; 43255, 43258, 43259-60, 43262-63, AA field series 14851, 14949-53, 14955-56, *ca* 30 km (by air) NNE Timika airport, Papua Province, Indonesia; AA field series 14988, E levee of Minajerwi River, *ca* 18.5 km (by air) SSE of Timika airport, Papua Province, Indonesia; 43264-66, 43270, 15273-74, 43271-74, 15129-31, 15797-99, 16015, Kopi River Rd, *ca* 13 km NNE Timika airport, Papua Province, Indonesia; 15267-68, *ca* 14 km (by air) S of Timika airport, Papua Province, Indonesia.
CAS: 12069, between Lake Sentani and Jautefa Bay, nr Hollandia [Jayapura], Papua Province, Indonesia; 64241, Dutch New Guinea; 117995, Uraru, Gulf Province, PNG; 192847-48, 192850-53, Amron Village, W of Baitabag Mission, Madang Province, PNG.
M. O'Shea collection (to be lodged with BMNH): MDM 69, Wasabmal, near Alexishafen, Madang Province, PNG.
RMNH: RENA 29839, New Guinea; RENA 29841-42, Etna Bay, West Papua Province, Indonesia.
USNM: 159853-54, Finschhafen, Morobe Province, PNG; 195721, 524235-37, *ca* 1-1.5 mi. S Brown River, *ca* 20 km NW Port Moresby, Central Province, PNG; 195722, 524238-40, Inawa, Mekeo subdistrict, Central Province, PNG; 195724, 232348, 524241-43, Vanimo, Sandaun Province, PNG.

Table 1. Measurements of the syntypes of *Lygosoma misolense* Vogt, 1928.

Legends: Measurements are in millimetres; for abbreviations of characters, see Materials and methods.

	ZMB 31523	ZMB 64387
SVL	45.5	36.5
AGL	19.5	15.5
FLL	15.5	13.5
HLL	26	22.5
HL	10.4	9.7
HW	7.9	6.2
HD	6.1	5.0











Generic allocation of the enigmatic scincid lizard *Lygosoma inconspicuum* F. Müller, 1895 (Squamata: Scincidae) from Sulawesi

Glenn M. Shea

Sydney School of Veterinary Science, B01, University of Sydney, NSW 2006, Australia *and* Australian Museum Research Institute, 1 William St., Sydney, NSW 2010, Australia; e-mail: glenn.shea@sydney.edu.au

Abstract: The holotype and only known specimen of *Lygosoma* (*Leiolepisma*) *inconspicuum* F. Müller, 1895 is redescribed and demonstrated to belong to the genus *Lipinia*, rather than *Scincella*, to which it has long been ascribed. Transfer of the species to *Lipinia* removes the biogeographic anomaly of a *Scincella* species occurring in Wallacea, distant from the distribution of the rest of the genus in Asia. *Lipinia inconspicua* is the first species of *Lipinia* in Sulawesi with an external ear, and is most similar to *Lipinia auriculata kempi* from the Philippines.

Key words: *Lipinia*, Sarasin, systematics, Sulawesi.

Introduction

Among the extensive herpetological collections made in Sulawesi by the Swiss zoologists Fritz and Paul Sarasin in 1893-1896 was a small nondescript skink, named as *Lygosoma inconspicuum* by Friedrich Müller in 1895. The holotype was redescribed by Boulenger (1897), who continued to place it in *Lygosoma*, along with the majority of the world's skink fauna at that time. When *Lygosoma* was eventually dismantled by Mittleman (1952), *inconspicuum* was transferred to *Scincella*, becoming *Scincella inconspicua*. However, Mittleman's assignment of species to genera was predominantly based on previous descriptions rather than the re-examination of specimens, and hence many of his allocations remain to be confirmed. The species has continued to be listed as a species of *Scincella* by most subsequent authors (Greer 1974; Kramer 1979; Welch et al. 1990; Iskandar & Tjan 1996; Wrobel 2004; Linkem et al. 2011; Koch 2012; Hedges 2014), although Wanger et al. (2011) list it as *Lipinia inconspicua*, without providing any discussion.

The placement of this species in *Scincella* is geographically anomalous, as it is the only species in the genus occurring in Sulawesi, and no other species of *Scincella* occurs as far south as Peninsular Malaysian (Grismer 2011) or in Indonesia (de Rooij 1915). The most recent revision of the genus in south-east Asia (Ouboter 1986) failed to mention the species.

Although described by both Müller (1895) and Boulenger (1897), both descriptions are brief and emphasise traditional characters. Hence, I here provide a more extended description of the holotype, and use this to reconsider its affinities and generic identity.

Materials and methods

The holotype of *Lygosoma inconspicuum* in the Naturhistorisches Museum Basel (NHMB) was examined on two occasions, firstly for an extended period on loan to the Australian Museum in 1999–2001, and more recently during a brief visit to the NHMB collection in 2015. Some comparative material of geographically proximate populations of *Lipinia noctua* was examined in the collections of Naturalis (Nationaal Natuurhistorisch Museum, Leiden, the Netherlands; RMNH) and the Museo Civico di Storia Naturale di Genova, Italy (MSNG).

Head shield nomenclature follows Taylor (1935).

Measurements were made with the structure held straight against a steel rule, or (for head measurements) with dial callipers, both sets of measurements taken with the instrument examined under a dissecting microscope to ensure correct





placement. Head measurements are to the nearest 0.1 mm; other measurements are to the nearest 0.5 mm. Snout-vent length (SVL) is from tip of snout to posterior edge of median precloacal scales, along the ventral surface; axilla-groin length (AGL) is from the posterior junction between forelimb and body wall, to the anterior junction between hindlimb and body wall, with the limbs held at right angles to the body axis; forelimb length (FLL) and hindlimb length (HLL) are from the medial extremity of the posterior crease between limb and body wall, to the tip of the claw, with the limb held at right angles to the body; head length (HL) is from the tip of the snout obliquely to the anteriormost margin of the external ear aperture; head width (HW) is at the widest point of the head, and head depth (HD) is at the deepest point of the head over the parietal table, including the lower jaw, at right angles to the labial margin.

Redescription of the holotype of *Lygosoma inconspicuum*

The holotype (NHMB 4742; Plate 2 fig. 1) is a mature but non-reproductive female.

Scalation: Nasals moderately separated (by a distance about 1/3 of the width of the frontonasal) by median dorsal lobe of rostral; prefrontals moderately separated by contact of frontonasal with frontal; frontoparietals medially fused; interparietal with parietal eye at junction of middle and posterior thirds; parietals in broad contact posterior to interparietal; nuchals in three pairs; supraoculars four, first two contacting frontal; supraciliaries nine, in linear contact with supraoculars, first supraciliary in contact with frontal; upper postocular extending into supraciliary row, becoming the penultimate supraciliary; last two supraciliaries larger, and extend medially posterior to fourth supraocular.

Nostril central in nasal; anterior and posterior loreals squarish; preocular single, separated from frontonasal by contact of posterior loreal with first supraciliary; presuboculars three, interdigitating with supralabials; 3L/4R small granules of lower eyelid separating pre- and postsuboculars along dorsal margin of subocular supralabials; postsuboculars four, lowermost interdigitating with supralabials; lower eyelid with an opaque rounded window; primary temporal single; secondary temporals two, lower overlapped by upper; upper secondary temporal separated from nuchals by a single scale; lower secondary temporal followed by two successive tall tertiary temporals; ear large, broadly ovoid, long axis vertical; tympanum thin but shallow-set, lacking lobules along margins.

Mental wider than long; postmental in contact with first two infralabials on each side; four pairs of enlarged chin shields, all laterally in contact with infralabials; first pair of chin shields in medial contact; second and third pairs separated by a single median scale; fourth pair separated by three scales. Body scales smooth and glossy, in 22 longitudinal rows at midbody; paravertebral scales slightly wider than adjacent dorsal scales, 56 from parietals to level of anterior margin of hindlimb, 59 to level of posterior margin of hindlimb; median pair of preanals enlarged, laterally overlapping adjacent preanals; fourth toe with paired scales above to base of fourth phalanx; last two (L) or three (R) supradigital scales single; lamellae below fourth toe 19L/20R, basally slightly broadened, distally (distal to second phalanx) distinctly narrower; toes 3–5 distinctly angulate, with an oblique dorsal deviation of the digit at the proximal interphalangeal joint of digits 3 and 5, and at the second interphalangeal joint of digit 4, then a return to a horizontal orientation at the subsequent interphalangeal joint (Plate 3 fig. 1).

Measurements: Snout-vent length (SVL) 50 mm; axilla-groin length 26.5 mm (53.0% of SVL); forelimb length 11 mm (22.0% of SVL); hindlimb length 17 mm (34.0% of SVL); head length (HL) 9.6 mm (19.2% of SVL); head width 6.0 mm (62.5% of HL); head depth 4.5 mm (46.9% of HL).

Coloration: Dorsum pale grey-brown, with a pair of oblique dark-brown blotches on the parietals, a pair of rounded dark spots over the nuchal region, then a few asymmetrically arranged dark spots paravertebrally over the posterior neck and forebody. A narrow dark upper lateral stripe from the posterior canthus of the eye, above the ear, and widening at the level of the forelimb, extending to the tail base. The upper edge of this stripe is sharply defined, and lies in the middle of the third dorsal scale row; the lower edge less well-defined, on scale row 5.

Face and lower flanks of body paler brown. Venter yellow, throat with pale-brown macules and clouding. Soles of feet weakly variegated with brown.

Parietal peritoneum black; visceral peritoneum on oviducts and ovaries unpigmented.

The above description is based on the specimen when first viewed in 2000. On my second examination of the specimen in 2015, it had darkened considerably in preservative (Plate 2 fig. 1).

Type locality

The type locality as stated by Müller (1895)









was "Boelawa-Gebirg circa 1200 m." (Boelawa Mountain, circa 1200 m), a locality subsequently given as "Bone Mtns, 3900 ft" by Boulenger (1897). Boelawa Gebirge is now Huidu Matabulawa, in the Bone Mountains. Comparison of the accounts of Sarasin and Sarasin (1894, 1905), and the map accompanying the former account indicates that the Sarasin brothers approached from the west, following the Bone River (Sungai Bone) upstream from Gorontalo. On 16 January 1894, they left the river headwaters, and continued to approach Huidu Matabulawa, reaching 1250 m, where they built a hut to shelter from a storm, and then later that day attaining about 1500 m to the south of the main peak, before descending the steep eastern side of the mountain to the valley of the Totoija (Pungea) River on 17 January, and following it downstream to Negeri Lama, reaching the coast on 21 January. Transferring the route to modern maps gives the coordinates of the type locality (at 1200 m) as approximately 0°30'N, 123°38'E. The locality is in South Bolaang Mongondow Regency, North Sulawesi Province.

Discussion

The placement of *Lygosoma* (*Leiolepisma*) *inconspicuum* in *Scincella* by Mittleman (1952) occurred at a time when the distinction between *Scincella* and *Lipinia* was poorly defined. The diagnoses provided by Mittleman (1952) did not provide any useful distinction between the two genera ("prefrontals large, forming a median suture; frontonasal at least as long as it is wide .....; preanals prominently enlarged" for *Lipinia vs* "prefrontals large, often forming a median suture; preanals prominently enlarged" for *Scincella*). Greer (1974) provided more extensive comparative diagnoses when recognising both as window-eyed members of what would become the tribe Sphenomorphini Welch 1982, with *Lipinia* lacking a postorbital bone, possessing (in most species) a colour pattern of strongly alternating dark and light stripes, small clutch size (one or two in most species), and dilated basal subdigital lamellae (in many species), while *Scincella* possesses a postorbital bone (in most species); lacks a pattern of alternative dark and light stripes, has a much larger clutch size, and lacks dilated basal subdigital lamellae. To these differences, Shea and Greer (2002) added the condition of the lower secondary temporal scale overlapping the upper secondary temporal scale in most *Scincella*, a character not present in *Lipinia*. Das and Greer (2002) provided a further list of "derived character states" (presumably intended as apomorphies, but without a formal cladistic analysis or identification of outgroups for polarisation) for *Lipinia* within the context of the Sphenomorphini, but did not provide comparative data for *Scincella*.

Scincella as defined by Greer (1974) has been subject to some modification. Some Himalayan species were transferred by Eremchenko (1987) to a new subgenus, *Himalblepharus*, in *Asymblepharus* Jeriomtschenko, Szczerbak, 1980, a genus originally established for a single species, *Ablepharus alaicus* Elpatjevsky, 1901, while several South Indian species were transferred to a new genus *Kaestlea* by Eremchenko and Das (2004). Balancing this loss of species to other genera, Greer and Shea (2003) subsumed the monotypic genus *Paralipinia* Darevsky, Orlov, 1997 into *Scincella*, and Nguyen *et al*. (2011) transferred to *Scincella* several species of Vietnamese skinks that had previously been described in the genus *Sphenomorphus*.

While neither *Scincella* or *Lipinia* have yet been subject to extensive sampling of their entire morphological envelopes in published genetic analyses, Linkem et al. (2011) and Pyron et al. (2013) did identify the two genera as distinct from each other on the limited sampling so far available, and unpublished analyses including additional species by Linkem (2013, pers. comm.) confirm this, although *Lipinia* itself was not recovered as monophyletic, but represented three distinct lineages (Linkem 2013).

The type species of *Lipinia*, *L. pulchella* Gray, 1845, was identified as part of a group of four *Lipinia* species with a distinct tympanum and a windowed lower eyelid. *Lipinia leptosoma* from Palau, originally described in the genus *Aulacoplax* Brown & Fehlmann, 1958, and with an extreme dilation of subdigital lamellae but a scaly (not windowed) lower eyelid (the only *Lipinia* species with these characters), represented a separate group, and two species of *Lipinia* with the tympanum covered with scales were a third group. All three groups were recovered as allied to different genera of sphenomorphin skinks. These three morphotypes are more broadly distributed in *Lipina*, with the majority of species falling into the first group, and eight species, *L. inexpectata* (Das & Austin, 2007), *L. infralineolata* (Günther, 1873), *L. nitens* (Peters, 1871), *L. quadrivittata* (Peters, 1867), *L. relicta* (Vinciguerra, 1892), *L. sekayuensis* Grismer et al., 2014, *L. subvittata* (Günther, 1873) and *L. surda* (Boulenger, 1900), representing the earless group, most of which also have the fourth supralabial (*vs* usually





the fifth) below the centre of the eye, fused frontoparietal scales, and 22 or fewer modal midbody scales, characters rare in other *Lipinia* species,

Austin (1995; 1998) similarly recovered *Lipinia leptosoma* as the most basal lineage to other eared *Lipinia,* although his sampling of species outside *Lipinia* was insufficient to demonstrate the polyphyly demonstrated by Linkem (2013).

Sampled representatives of the earless group were also recovered as a distinct genetic lineage of *Lipinia* by Das and Austin (2007, n = 2 species) and Grismer et al. (2016, n = 6 species), although again the sampling of taxa outside *Lipinia* was insufficient to demonstrate polyphyly of the genus. Most of the species in the earless group (4 of 5 species studied) were recovered as a clade in a preliminary cladistic analysis of morphology by Das and Greer (2002). The generic name *Cophoscincus* Peters, 1867 is available for the earless group, should further more extensive studies confirm its monophyly together with polyphyly of *Lipinia*.

With only a single specimen known of the species, I have not been able to examine the skull of *Lygosoma inconspicuum* to determine the presence or absence of the postorbital bone, and the holotype is not gravid, precluding determination of clutch size. However, on external morphology, *Lygosoma inconspicuum* falls into the range of variation of *Lipinia*, and more specifically, it does not show morphological similarity to either *Lipinia leptosoma* or the earless clade of *Lipinia*, but lies within the nominotypic group of *Lipinia* in having an exposed tympanum and the fifth supralabial below the eye and separating pre- and postsubocular scale series. It differs from *Scincella* in having the lower temporal scale overlapped by the upper secondary temporal, and has distinctly dilated basal subdigital lamellae, as in many *Lipinia*, and the digits, particularly toe 4, show the arched distal extremity present in some arboreal species of *Lipinia*, with a further shortening of the antepenultimate phalanx on the fourth toe in some of these species (Shea & Greer 2002). The colour pattern is not of strongly contrasting pale and dark stripes, regarded as diagnostic of *Lipinia* by Greer (1974), but some other recently recognised *Lipinia* species also lack these (Günther 2000; Shea & Greer 2002; Grismer et al. 2014; 2016), and the lack of dark markings along the mid-vertebral line, flanked by dark paravertebral spots, does hint at the pale vertebral stripe of many *Lipinia* species.

Hence, because of the enlarged subdigital lamellae and arched terminal ends of the digits, and the lower secondary temporal scale overlapped by the upper secondary temporal scale, I formally transfer *Lygosoma* (*Leiolopisma*) *inconspicuum* Müller, 1895 from *Scincella* to *Lipinia*, as *Lipinia inconspicua*. The biogeographic anomaly of *Scincella* in Sulawesi is resolved, with *inconspicua* instead being part of a genus widespread in Indonesia, Papua and the Philippines. This transfer also follows previous transfers to *Lipinia* of a number of other species assigned by Mittleman (1952) to *Scincella*: *miota* Boulenger, 1895 (now a synonym of *L. noctua*; Zweifel 1979), *macrotympanum* Stoliczka, 1873, *pulchra* Boulenger, 1903, *semperi* Peters, 1867, *vittigera* Boulenger, 1894, and *vulcania* Girard, 1858 by Greer (1974), *subnitens* Boettger, 1896 (as a synonym of *L. noctua*) by Zweifel (1979), and *nitens* Peters, 1871 by Das and Greer (2002).

Within *Lipinia*, *inconspicua* differs from the earless species in possessing a distinct tympanum. It is one of only three species among the non-earless *Lipinia* with fused frontoparietals. Variation in scalation of *L. pulchra*, a species of north-eastern New Guinea, is poorly studied, but Zweifel (1979) reported the species to routinely have fused frontoparietals, and based on the type description of two specimens, it has slightly more midbody scales (24 vs 22) and more subdigital lamellae (22 vs 19-20). Better sampling may efface these differences, but *L. pulchra* has a very different colour pattern to *L. inconspicua*, with a narrow pale vertebral stripe from tip of snout to midbody, terminated by median fusion of broad dark paravertebral stripes, themselves terminating at the base of the tail, where they are replaced by median fusion of pale dorsolateral stripes that commence at midbody and continue (fused) to the tail tip (Zweifel 1979).

In the widespread *L. noctua*, there is marked variation in the fusion of the frontoparietals, with higher frequencies in south-eastern New Guinea (Zweifel 1979). However, the nearest populations of *L. noctua* to *L. inconspicuum*, from the northern Maluku Islands (Morotai, Halmahera, Ternate), and to which the subspecific name *ternatensis* was applied by Peters and Doria (1878), have very low frequencies of fusion of the frontoparietals (Zweifel 1979), and distinctively different colour pattern motif, with a partly or fully longitudinally coalescing series of large dark paravertebral blotches, leaving a pale vertebral stripe with sharp edges at least anteriorly, and more laterally, a pair of pale dorsolateral stripes. Zweifel (1979) only had samples of this form from Morotai, but I can confirm that this motif is also present on Halmahera (RMNH.RENA 5466, Tobelo) and Ternate (three syntypes of *Lygosoma*






noctua var. *ternatensis*, MSNG 27976; Plate 3 fig. 2), while specimens from the adjacent Vogelkop of New Guinea (RMNH.RENA 7293, Fak Fak; 48421-22, 48424, Ajamaroe; 48423, Erokwera) have the more typical colour pattern of *L. noctua*. Both the Malukan and Vogelkop populations of *L. noctua* have a greater number of midbody scales than *L. inconspicua* (24-26 vs 22).

The presence of fused frontoparietals is also geographically linked in *Lipinia auriculata* (Taylor, 1917) of the Philippines (Brown & Alcala 1956; 1980), with the nominate subspecies and *L. a. kempi* (Taylor, 1919) possessing fused frontoparietals, but *L. a. herrei* (Taylor, 1922) having paired frontoparietals. *Lipinia inconspicua* differs from *L. a. auriculata* in having distinct prefrontals (*vs* usually fused to the frontonasal), but is similar in most respects to *L. a. kempi* of Minoro and Tablas Islands in the Central Philippines, including a colour pattern that usually involves dark blotches on the paravertebral scale rows (Brown & Alcala 1980). Detailed descriptions of variation in scalation are unavailable for *L. a. kempi*, but the illustration of the head shields of the holotype provided by Taylor (1919) does show only three pairs of enlarged chin shields, with only the second pair separated by a single median scale, while the holotype of *Lygosoma inconspicuum* has four pairs of chin shields, with both second and third pairs separated by a median scale.

Within Sulawesi, *L. inconspicua* is the only species of *Lipinia* possessing an external tympanum; the other two species reported from the island (*L. infralineolata* and *L. subvittata*; Koch 2012) are earless.

Given the angulation of the longer digits of *L. inconspicua*, it is likely that, like many *Lipinia* species, it is arboreal. This, in combination with small size and a distribution in a remote part of North Sulawesi, may explain the lack of modern records of the species. Similar difficulties in sampling exist for several species of *Lipinia* (Smith 1935; Brown & Alcala 1963; Das 1997; Grismer 2011; Bucklitsch et al. 2012; Supsup et al. 2016).

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A new species of *Sphenomorphus* (Squamata: Scincidae) from the Doberai Peninsula of New Guinea, with a redescription of *Sphenomorphus consobrinus* (Peters et Doria, 1878)

Glenn M. Shea

Sydney School of Veterinary Science, B01, University of Sydney, NSW 2006, Australia *and* Australian Museum Research Institute, 1 William St., Sydney, NSW 2010, Australia; e-mail: glenn.shea@sydney.edu.au

Abstract: *Sphenomorphus dekkerae* sp. nov. is described from two specimens from Ayamaru on the Doberai Peninsula, collected in 1952. It is a member of the *Sphenomorphus maindroni* (Sauvage, 1879) species group, but its affinities to the other members of this species group are uncertain. Although it shows a superficial similarity to *S. consobrinus* of the Maluku Archipelago, it does not appear to be closely related to that species, which is not a member of the *S. maindroni* species group. *Sphenomorphus consobrinus* (Peters et Doria, 1878) is redescribed and illustrated.

Keywords: *Sphenomorphus*, new species, systematics, Doberai Peninsula, Maluku Archipelago, morphology.

Introduction

The herpetofauna of Indonesian New Guinea, representing the western half of the island of New Guinea, has until recently been neglected for nearly a century. Although it was the earlier half of the island to be collected by Europeans during the nineteenth century, the few collections made in the region during the twentieth century, mostly by Dutch expeditions, have remained poorly studied. Recent herpetological fieldwork in the area has concentrated on the frog fauna, resulting in the description of numerous new species (Blum & Menzies 1988; Günther 2000a; 2001; 2002a-b; 2003a-d; 2004a & b; 2006a-e; 2008a & b; 2009a & b; 2010; 2013; 2015; Günther & Knop 2006; Günther & Richards 2000; 2005a & b; Günther et al. 2001; 2009; 2010; 2012; 2016; Menzies 1987; Menzies et al. 2008; Oliver & Richards 2007; Oliver et al. 2007; 2012; Richards 2001; Richards & Iskandar 2000; 2001; 2006; Richards et al. 2009; Zweifel et al. 2005). In contrast, taxonomic work on the scincid lizard fauna has largely been based on historic collections, with revision of the two large genera *Emoia* Gray, 1845 (Brown 1991) and *Carlia* Gray, 1845 (Zug 2004) as part of New Guinea-wide revisions, and description of new species of *Lipinia* Gray, 1845 (Günther 2000b) and *Lobulia* Greer, 1974 (Greer et al. 2005). Only one paper, describing two new species of *Carlia* (Zug & Allison 2006) is predominantly based on recent collections of skinks from Indonesian New Guinea. The third large skink genus in New Guinea, *Sphenomorphus* Fitzinger, 1843, has not been the subject of a full regional revision since de Rooij (1915).

Thirteen currently recognised species of *Sphenomorphus* have been described from material from Indonesian New Guinea: *S. derooyae* (de Jong, 1927), *S. jobiensis* (Meyer, 1874), *S. longicaudatus* (de Rooij, 1915), *S. maindroni* (Sauvage, 1879), *S. mimikanus* (Boulenger, 1914), *S. minutus* (Meyer, 1874), *S. muelleri* (Schlegel, 1837), *S. nigriventris* (de Rooij, 1915), *S. oligolepis* (Boulenger, 1914), *S. fuscolineatus* Greer, Shea, 2004, *S. simus* (Sauvage, 1879), *S. undulatus* (Peters, Doria, 1878) and *S. wollastoni* (Boulenger, 1914). Of these, only *S. fuscolineatus* has been described in the past 80 years.

An additional five species, *S. meyeri* (Doria, 1874), *S. neuhaussi* (Vogt, 1911), *S. pratti* (Boulenger, 1903), *S. schultzei* (Vogt, 1911) and *S. solomonis* (Boulenger, 1887) have been reported from the region (de Rooij 1915; 1919; Greer & Parker 1974; Allison 2007a; Shea 2012).






During visits in 2000, 2013 and 2015, I examined the New Guinea *Sphenomorphus* in the collection of Naturalis, Nationaal Natuurhistorisch Museum, Leiden, The Netherlands (RMNH), which included collections made by and on behalf of Dutch expeditions during the 1930s and 1950s. Among the collections were two specimens of an undescribed *Sphenomorphus* from the Doberai Peninsula. These specimens had previously been recognised as an undescribed species by Dekker (1977) in a thesis, but no formal description was published at the time. Although the species was clearly distinct from all described New Guinea *Sphenomorphus*, the proximity of the Doberai Peninsula to the Maluku Archipelago required comparison of the new species with *Sphenomorphus* reported from that region as well. One species, *S. consobrinus* (Peters, Doria, 1878), described from Pulau Bacan, and subsequently reported from Halmahera (Boettger 1895; 1902) and Morotai (Tanner 1950), showed some similarity to the new species in scalation and body proportions, although published descriptions of this species provided only limited detail. Examination of material of this species, including most of the specimens reported by Boettger (1895) and Tanner (1950) as well as the types, has confirmed the distinction between the two species, which are not closely related. This paper describes the new species and provides a detailed redescription and the first illustrations of *S. consobrinus*.

Materials and methods

Collection codons follow Leviton et al. (1985).

Head scale nomenclature mostly follows Taylor (1935). Subocular scales are the enlarged scales bordering the dorsal border of the supralabial scale below the centre of the eye, and between the posteriormost presubocular and the anteriormost postsubocular. The postsupraocular is as defined by Greer & Shea (2004). In a few instances, there is inconsistency among authors in the nomenclature of scales bordering the eye. Greer (1982) and Sadlier (1984) refer to the first of Taylor's presuboculars as the lower of two preoculars. Greer (1983) uses the term pretemporal for two scales that would represent the posteriormost supraciliary and the dorsalmost postsubocular of Taylor. I maintain Taylor's nomenclature in this paper, but note the equivalence of Greer's nomenclature for the scales at the posterior corner of the eye. Head scales are numbered from anterior to posterior.

Midbody scales are counted at the mid-point of the axilla-groin interval; paravertebral scales are counted on the left side of the midline from the first scale posterior to the parietals to the last scale anterior to the level of the hind limbs, with limbs held at right angles to the body; subdigital scales are counted on the fourth toe from the base of the crease between third and fourth toes, to and including the terminal sheathing scale at the tip of the claw.

Measurements were made with the structure held straight against a steel rule, or (for head measurements) with dial callipers, both sets of measurements taken with the instrument examined under a dissecting microscope to ensure correct placement. Head measurements are to the nearest 0.1 mm; other measurements are to the nearest 0.5 mm. Snout-vent length (SVL) is from tip of snout to posterior edge of median precloacal scales, along the ventral surface; axilla-groin length (AGL) is from the posterior junction between forelimb and body wall, to the anterior junction between hindlimb and body wall, with the limbs held at right angles to the body axis; forelimb length (FLL) and hindlimb length (HLL) are from the medial extremity of the posterior crease between limb and body wall, to the tip of the claw, with the limb held at right angles to the body; head length (HL) is from the tip of the snout obliquely to the anteriormost margin of the external ear aperture; head width (HW) is at the widest point of the head, and head depth (HD) is at the deepest point of the head over the parietal table, including the lower jaw, at right angles to the labial margin.

Taxonomic part

***Sphenomorphus dekkerae* sp. nov.** (Figs 1-2, plate 4 figs 1-2, plate 6 figs 1-2)

http://zoobank.org/D595665F-7C98-43E4-A11C-73EEE595CC73

Holotype: RMNH.RENA 30144, Ajamaroe [= Ayamaru], Vogelkop [= Doberai Peninsula], [Maybrat Regency, West Papua Province, Indonesia]. Collected by Leo D. Brongersma and Willem J. Roosdorp in June 1952.

Paratype: RMNH.RENA 30145, data as for holotype.

Derivatio nominis: The species is named for Ms Els J. Dekker, who first recognised its distinctive morphology in 1977.

Diagnosis: A small *Sphenomorphus* (SVL of both mature specimens 50 mm), differing from all other members of the genus in the combination of postsupraocular present, and no division of






temporal scalation (primary, upper secondary and lower secondary temporal scales single, last two supralabials undivided), but with the appearance of a divided penultimate supralabial created by enlargement of the second postsubocular, intruding between penultimate supralabial and primary temporal.

Description: Scalation: Rostral with a prominent broad dorsal lobe with convex apex, moderately separating nasals; nostril in centre of nasal; supranasals and postnasals absent; prefrontals moderately (holotype) to very narrowly (paratype) separated, supraoculars four, first two in contact with the frontal; frontoparietals in broad medial contact; interparietal with parietal eye at junction of third and fourth quarter of length; parietals in broad medial contact behind interparietal; transversely dilated nuchals usually absent (a single enlarged nuchal on the right side in the paratype), each parietal bordered by upper secondary temporal, a paravertebral, and one (n = 3) or two (n = 1) intervening scales; supraciliaries 10 (holotype) - 10L/11R (paratype), first usually narrowly separated from frontal (in narrow contact unilaterally on the holotype), the penultimate and last supraciliary each divided into an upper and lower scale (the upper part of the penultimate supraciliary projects strongly medially, and appears as a "fifth" supraocular, the lower part representing the upper postocular of Taylor (1935), the lower part of the last supraciliary equivalent to the anterior pretemporal of Greer (1983), and the upper part of the last supraciliary, medially contacting the frontoparietal, representing the postsupraocular of Greer and Shea (2004); anterior and posterior loreals equal in height, the anterior much taller than wide, the posterior about as wide as tall at the top, but much narrower at the base, the anterior loreal divided into an upper and lower scale bilaterally in the paratype; preocular single, wedged between first supraciliary and anterior presuboculars, excluded from contact with the prefrontal by contact between posterior loreal and first supraciliary, and followed by one or two small imbricate scales between supraciliary row and upper eyelid; presuboculars three, strongly interdigitating with the supralabial row; suboculars two; postsuboculars 4-5 (mean = 4.75, SD = 0.5, n = 4), the second postsubocular protruding posteriorly between the penultimate supralabial and primary temporal to create the impression of a divided penultimate supralabial (however, in other members of the *S. maindroni* species group, division of this supralabial involves creation of an upper scale overlapped by the lower scale, rather than overlapping the lower scale, as seen here); lower eyelid scaly, the scales along the palpebral row small, interdigitating with taller scales below, the central tall scales noticeably broader than those anterior and posterior; supralabials seven, fifth below centre of eye; postsupralabials two; primary temporal single; upper secondary temporal single (divided into an anterior and posterior scale on left side of holotype) and overlapping the single large lower secondary temporal; lower secondary temporal overlapping upper postlabial and a tall tertiary temporal; ear elliptical, with long axis vertical to posterodorsally oblique; long axis of ear shorter than width of eye, but longer than height of eye; lobules along anterior margin of ear absent; tympanum thin, deeply sunk; infralabials six; postmental usually in contact with a single infralabial on each side (holotype contacting two on right side only); first pair of chin shields in median contact; second pair of chin shields separated by a median scale; third chin shield on each side divided into a lateral and medial scale, and medially separated by three scales; all three pairs of chin shields laterally in contact with the infralabials. Body scales glossy, in 30 (holotype)-33 (paratype) longitudinal rows at midbody; scales in paravertebral rows slightly broader than adjacent dorsal scale rows, 53 (holotype)-58 (paratype); medial pair of preanal scales overlap lateral preanals; scales above fourth digit basally in three or four rows, paired over most of length of digit, only the two terminal scales single; lamellae below fourth toe 20-22 (mean = 21.0, sd = 0.82, n = 4), grooved to distinguish a bluntly keeled larger preaxial series from a narrower, low postaxial series; a sharp line of demarcation between large granular scales of sole and imbricate scales of dorsum of foot posteriorly between fourth and fifth toe.

Osteology: presacral vertebrae 26; phalangeal formula of manus and pes 2.3.4.5.3 and 2.3.4.5.4 respectively. Premaxillary teeth 9.

Measurements: The mature male holotype, with turgid testes, has SVL 50 mm, AGL 25 mm, FLL 13 mm, HLL 19 mm; HL 11 mm; HW 8.5 mm; HD 6.7 mm. The tail is regenerated. The ovigerous female paratype has SVL 50 mm; AGL 25.5 mm; FLL 12 mm; HLL 17.5 mm; HL 10.4 mm; HW 7.6 mm; HD 4.6 mm. The tail is missing. Combined, AGL/SVL = 0.5-0.51; FLL/SVL = 0.24-0.26; HLL/SVL = 0.35-0.38; sum of limb lengths/AGL = 1.16-1.28; HL/SVL = 0.21-0.22; HW/HL = 0.73-0.77; HD/HL = 0.44-0.61 (the lower head depth value for the paratype may be a preservation artefact).

Coloration (in preservative): Pale dorsal ground





colour light yellow-brown, largely obscured by coarse dark red-brown variegations, leaving small pale spots on head, and irregular, broken narrow pale transverse markings on body becoming more complete and regular on tail. Face laterally brown mottled, including labials (paratype), or with lower parts paler (holotype); neck and body upper laterally like dorsum, but with darker variegations slightly darker, giving a weak impression of a broad dark upper lateral stripe containing pale spots. Lower laterally, neck and body yellow with weak coarse mid-brown variegations. Tail laterally similar to dorsum. Ventrally, yellow-cream, throat immaculate (holotype) or with weak mid-brown flecking and a few variegations more laterally (paratype). Limbs above dark brown with small pale spots; below as for body venter; plantar and palmar surfaces light brown.

Reproduction: The female paratype has a single shelled egg in each oviduct.

Type locality: The species was collected by Leo Daniel Brongersma and his assistant Willem Johannes Roosdorp (Hoogmoed 1995; 2000), on the first of several field trips by Brongersma to Dutch New Guinea in the 1950s (Frodin 2007). Ajamaroe (now Ayamaru), located at approximately 1°16'S 132°11'E (Fig. 2), is on the south west shore of Jow, the westernmost of the Ajamaru Lakes on the Doberai Peninsula, at an altitude of approximately 300 m; the area at the time of collection of the types is described and illustrated by Boeseman (1963). It is not known whether the types were collected from the lower marshy habitat on the lake shore, or the forested hilly country surrounding the lake, but I suspect the latter is the more likely habitat, based on known habitat preferences of other members of the *Sphenomorphus maindroni* species group. Further details of the region have been provided to me by Dmitry Telnov, who visited the area in 2015 (Telnov, pers. comm.). The lakes are surrounded by limestone karst, which takes the form of rounded limestone mounds covered in a low but dense dry sclerophyll whipstick forest on skeletal soils (Plate 6 figs 1-2). The eastern lakes have dried out and been replaced with grassland, while the western lake is much less extensive, with the exposed former lake bed now covered by grassland, with small trees along drainage channels entering the lake.

Comparison with other species: The presence of a postsupraocular scale places this species in the *S. maindroni* group of Greer and Shea (2004). Within this group, *S. dekkerae* would key to couplet 19 using the key provided by Greer and Shea (2004), along with *S. brunneus*, *S. loriae, S. oligolepis* and *S. solomonis*. Of these four species, only *S. solomonis* occurs on the Doberai Peninsula (de Rooij 1915; Greer 1973; Greer & Parker 1974). *Sphenomorphus dekkerae* sp. nov. may be differentiated from all four species in having no division of either of the last two supralabials, 10-11 supraciliaries (*vs* a mode of 8-9 in the other four species), and a more strongly and evenly defined pattern of dark markings on body dorsum and flanks, with a generally transverse orientation (*vs* sparser, less continuous pattern, and with generally longitudinal orientation). *Sphenomorphus oligolepis*, *S. brunneus* and *S. solomonis* have the last supralabial divided, the penultimate supralabial undivided, the primary temporal usually undivided (modally divided in some populations of *S. solomonis*) and the upper and lower secondary temporals undivided; the division of the last supralabial is into an upper and lower scale, the upper overlapping the lower, and the two scales together covering the same field as the last supralabial of *S. dekkerae*). *Sphenomorphus loriae* has further division of scales in this region. It may further be differentiated from *S. oligolepis* by having more numerous subdigital lamellae (20-22 *vs* 9-12) and midbody scales (30-33 *vs* 24-26), but fewer paravertebral scales (53-58 *vs* 60-69), from *S. loriae* by having fewer paravertebral scales (*vs* 86-92), more subdigital lamellae (*vs* 13-16), and the postmental contacting only a single infralabial on each side (*vs* two), from *S. brunneus* in having more numerous subdigital lamellae (*vs* 15-21) and midbody scales (*vs* 25-28), and only the first pair of chin shields in contact (*vs* first two pairs in median contact). From populations of *S. solomonis* on the Doberai Peninsula and adjacent islands, *S. dekkerae* additionally differs in its smaller size (SVL 50 mm *vs* up to 79 mm), fewer paravertebral scales (*vs* 58-71), and more numerous subdigital lamellae (*vs* 12-20). These differences reflect the relatively longer limbs and shorter trunk of *S. dekkerae* (sum of limb lengths/AGL 115.7-128.0% *vs* 67.8-93.1%, mean = 80.9%, n = 27, for mature-sized *S. solomonis* from the region). One other described member of the *S. maindroni* species group occurs on the Doberai Peninsula, *S. maindroni* itself. This species may be differentiated from *S. dekkerae*, with which it shares a transversely oriented dorsal pattern of broader dark markings and narrow pale markings, by the more complete nature of the pale bands, by having broadly contacting prefrontal scales, the first two pairs of chin shields in contact, multiple pairs of nuchal shields, more numerous paravertebral scales (60-69) and paravertebral scale rows much broader than those





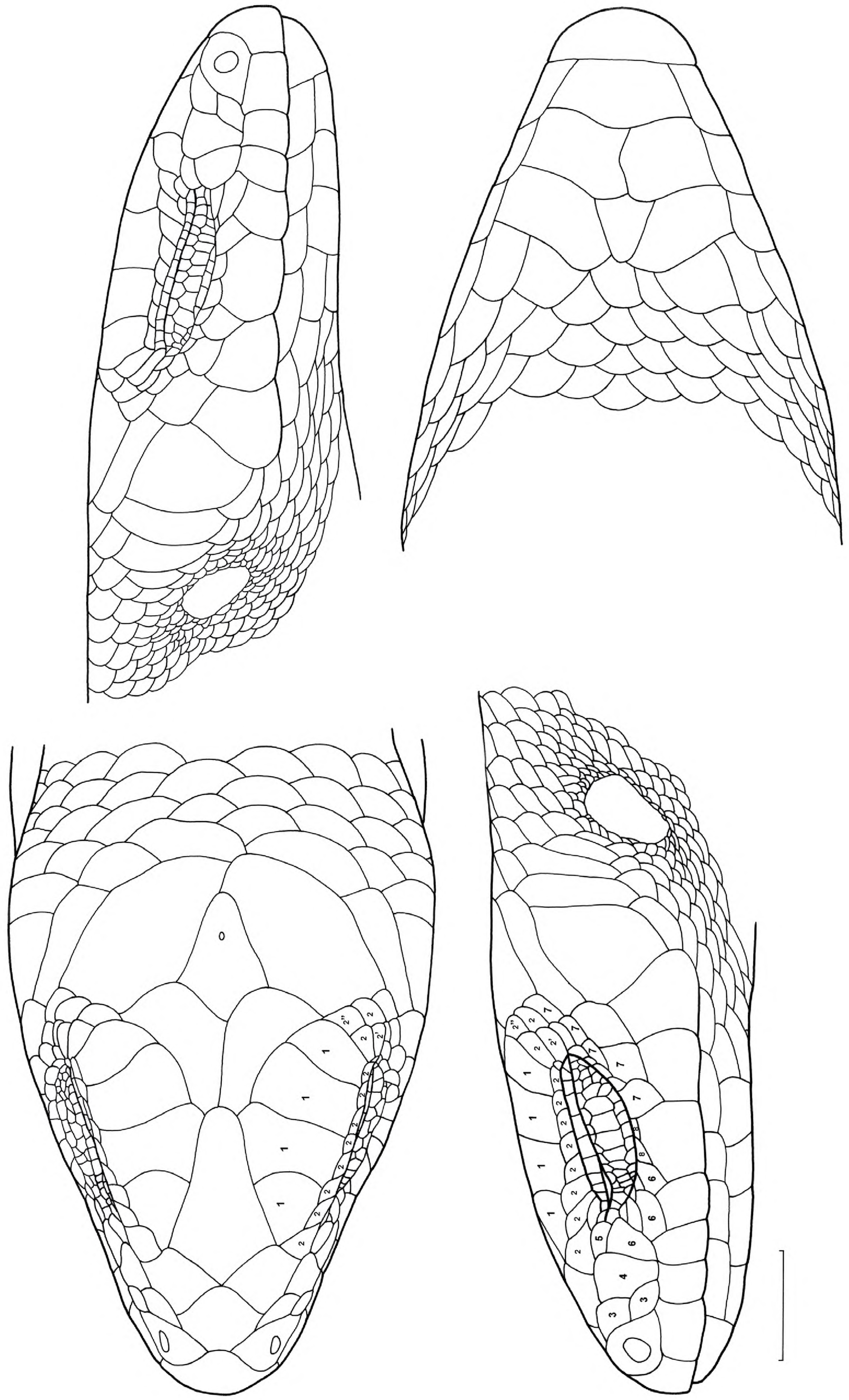



Figure 1. Head shields of paratype of *Sphenomorphus dekkerae* sp. nov. in top, left and right side, and ventral view respectively. Circumocular scalation identified by numbers: 1 – Supraoculars; 2 – Supraciliaries (2' – Division of penultimate supraciliary, equivalent to upper postocular; 2" – Division of last supraciliary, equivalent to postsupraocular); 3 – Anterior loreal; 4 – Posterior loreal; 5 – Preocular; 6 – Presuboculars; 7 – Postsupraoculars; 8 – Subocular s [scale bar 2 mm].



lateral to them. Of species occurring in the Maluku Archipelago to the west of the Doberai Peninsula, only *S. consobrinus* is similar to *S. dekkerae*. The two species have similar body proportions, seven supralabials, grooved subdigital lamellae (like most New Guinea *Sphenomorphus*), undivided temporal scales and modally lack nuchal scales (occasionally having one nuchal unilaterally), but differ in that *S. consobrinus* lacks a postsupraocular scale, has no division of the supralabial scales, has broadly contacting prefrontal scales, the postmental contacting the first two infralabials on each side, and has the second and third pair of chin shields separated from the infralabials by an oblique row of interposed scales, and is much smaller (maximum SVL 38 mm). Further, as reported by Greer (1977), *S. consobrinus* has only a single oviduct, while *S. dekkerae*, like most *Sphenomorphus*, has two.

***Sphenomorphus consobrinus* (Peters et Doria, 1878)** (Fig. 3, plate 5 figs 1-2)

Syntypes 7 specimens: MSNG 27875, Batjan [= Pulau Bacan], collected by Antonie Augustus Bruijn in 1875 (Capocaccia, 1961). While Bruijn's localities are often imprecise or incorrect (Heij 2011), there would seem to be no reason to doubt the type locality in this case, as it is close to other known localities for the species.

References: *Lygosoma* (*Hinulia*) *consobrinum* Peters et Doria, 1878: 342.

Redescription. Diagnosis: A very small *Sphenomorphus* (maximum SVL 38 mm), with last two supralabials, primary and upper and lower secondary temporals undivided, postsupraocular absent, lamellae below fourth toe grooved, and second and third pair of chin shields separated from infralabials by an interposed row of oblique scales.

Description: Scalation: Rostral with a prominent broad dorsal lobe with convex apex, moderately separating nasals; nostril in centre of nasal; supranasals and postnasals absent; prefrontals usually in moderate to broad medial contact (n = 14 of 17), rarely narrow contact, point contact or narrowly separated (one specimen each); supraoculars four, first two in contact with the frontal; frontoparietals in broad medial contact; interparietal with parietal eye at junction of second and third third of length; parietals in broad medial contact behind interparietal; transversely dilated nuchals 0-2 on each side, usually absent (n = 17 of 22 sides), each parietal bordered by and overlapping the upper secondary temporal, a paravertebral scale, and no (n = 1), one (n = 6) or two (n = 3) intervening scales; supraciliaries 7-9, usually eight (9 of 14 sides), first in point to narrow contact with frontal, the penultimate divided into an upper and lower scale (the upper part of which does not project strongly medially, and the lower part equivalent to the upper postocular of Taylor, 1935), and the last representing the anterior pretemporal of Greer (1983); anterior and posterior loreals each single, equal in height,



Figure 2. Position of type locality of *Sphenomorphus dekkerae* sp. nov. on Doberai Peninsula.



the anterior taller than wide, the posterior a little wider at the top, but slightly narrower at the base; preocular single, wedged between first supraciliary and anterior presuboculars, excluded from contact with the prefrontal by contact between posterior loreal and first supraciliary, and followed by two small imbricate scales between supraciliary row and upper eyelid; presuboculars usually three (18 of 22 sides) or four, strongly interdigitating with the supralabial row; suboculars one (10 of 22 sides) or two; postsuboculars four (11 of 22 sides) or five, first strongly interdigitating with supralabials, last equivalent to posterior pretemporal of Greer (1983); lower eyelid scaly, the scales along the palpebral row small, interdigitating with taller scales below, the central tall scales only slightly broader than those anterior and posterior; supralabials seven (n = 32 of 34 sides) or eight, fifth (or sixth, when a total of eight) below centre of eye, between last presuboculars and first postsubocular, last two undivided; postsupralabials two; primary temporal single (divided into an upper and lower scale bilaterally in one individual); upper secondary temporal single and overlapping the single large lower secondary temporal; lower secondary temporal overlapping upper postlabial and a tall tertiary temporal; ear elliptical, with long axis vertical; long axis of ear shorter than width of eye, but equal to height of eye; lobules along anterior margin of ear absent; tympanum thin, deeply sunk; infralabials seven; postmental in contact with first two infralabials on each side (bilaterally one on one individual); first pair of chin shields in medial contact; second pair of chin shields separated by a median scale; third pair of chin shields medially separated by three scales; laterally, only first pair of chin shields in contact with infralabials, second and third pairs separated from infralabials by one row of oblique scales. Body scales glossy, in 29-34 longitudinal rows at midbody (mean = 31.4, sd = 2.37, n = 17); scales in paravertebral rows very slightly broader than adjacent dorsal scale rows, 47-56 (mean = 50.3, sd = 3.15, n = 16) from first scale behind parietal to level of anterior margin of hindlimb; medial pair of preanal scales overlap lateral preanals; body scales apparently loosely attached to underlying subcutis, as many specimens have patches of dorsal, lateral or ventral scales torn away ("tear-away scales" of Greer 1986, previously only reported for some *Lerista* and *Ctenotus* species among skinks); scales above fourth digit basally in 3-4 rows, three over most of the proximal phalanx, paired from the base of the second phalanx, and with only the two or three terminal scales single; lamellae below fourth toe 17-25 (mean = 20.2, sd = 1.99, n = 33), grooved to distinguish a larger and more projecting preaxial series from a narrower, low postaxial series; a sharp line of demarcation between large granular scales of sole and imbricate scales of dorsum of foot posteriorly between fourth and fifth toe.

Osteology: presacral vertebrae 26; postsacral vertebrae 35 (n = 1); phalangeal formula of manus and pes 2.3.4.5.3 and 2.3.4.5.4 respectively. Premaxillary teeth 9 (n = 1).

Measurements: SVL 22-38.5 mm (n = 16, only two less than 30.5 mm); AGL/SVL = 0.451-0.526 (mean = 0.476, n = 11); FLL/SVL = 0.211-0.295 (mean = 0.244, n = 11) ; HLL/SVL = 0.342-0.422 (mean = 0.388, n = 11); sum of limb lengths/AGL = 1.050-1.550, mean = 1.323, n = 11); HL/SVL = 0.200-0.264 (mean = 0.220, n = 11); HW/HL = 0.654-0.716 (mean = 0.685, n = 11; HD/HL = 0.455-0.554 (mean = 0.513, n = 10).

Coloration (in preservative): Pale dorsal ground colour yellow-brown, overlain by sparse but coarse dark brown bars and blotches, which may coalesce to form weak irregular dark transverse bands. Tail dorsum may be similar or immaculate pale. A narrow dark brown upper lateral stripe or zone beginning indistinctly across loreals, then from postoculars, above ear, and along neck and body, breaking into a series of dark blotches near groin and onto tail base. Stripe has irregular margins and variably contains pale spots, and is narrowly bordered above with pale yellow on neck and sometimes further posteriorly. Lower laterally, face, body and tail yellow to cream with weak, sparse brown reticulum or spotting. Labial scales with dark brown margins. Venter yellow to cream, throat with sparse thin brown streaks, body and tail immaculate. Limbs dark brown with small yellow spots dorsally, yellow/cream below; palmar and plantar surfaces light brown, fading to yellow.

Differential diagnosis: The absence of a postsupraocular scale excludes this species from the *S. maindroni* group. It differs from *Glaphyromorphus* Wells, Wellington, 1984 species, which it otherwise superficially resembles, and most *Sphenomorphus* species outside New Guinea in having grooved subdigital lamellae. It further differs from almost all *Sphenomorphus* species in the Indonesian archipelago and New Guinea in having no fragmentation of the temporal and posterior supralabial scales. Only *S. buettikoferi* (Lidth de Jeude, 1905), *S. capitolythos* Shea & Michels, 2008 (replacement name for *S. keiensis* (Kopstein, 1926)) and *S. rufus* (Boulenger,





1887) among the Indonesian species agree with *S. consobrinus* in having a generally primitive temporal configuration consisting of a single primary temporal, single lower secondary temporal, single upper secondary temporal overlapping the lower, and last two supralabials undivided. *Sphenomorphus consobrinus* differs from all three of these species in having the second and third chin shields separated from the infralabials by a single row of oblique scales.

Discussion

The description of *Sphenomorphus dekkerae* adds a third reptile species only known from the lowlands of the western side of the Doberai Peninsula. Previously, Brongersma (1953) described *Lygosoma* (*Leiolopisma*) *venemai* (now *Lipinia venemai*) from the same region as *S. dekkerae*, and earlier (Brongersma 1930) he described *Gehyra leopoldi* from the vicinity of Sorong. I am aware of at least one other *Sphenomorphus* awaiting description from the Ayamaru area. In a review of areas of endemism in Indonesian Papua, Allison (2007b) did not identify the western lowlands of the Doberai Peninsula. Instead, the identified areas of endemism in Indonesian New Guinea were mostly high altitude ranges and islands. However, the recognised areas of endemism largely parallel the areas of Indonesian New Guinea that have been subject to collection, with large intervening areas from which few or no species are known, and may instead reflect collection intensity rather than endemism.

Specimens examined

***Sphenomorphus brunneus* Greer, Parker, 1974**
Material examined: 151 specimens, MCZ R83332-34, R99958-69, R99974-93, R100514-48, R101418-47, R101453-83, Karimui, Simbu Province, PNG; R90200-04, Bomai, Tive Plateau, Simbu Province, PNG; R101186, Uraru, Gulf Province, PNG; R101485, Weiana, Gulf Province, PNG; R101486-87, between Camp III and Weiana, Gulf Province, PNG; R101500-01, R102539, Oroi [= Orloli], Gulf Province, PNG; R102169, Ining River at Soliabedo, Simbu Province, PNG; R105552, Iudo, Simbu Province, PNG; 130884, Soliabedo, Simbu Province, PNG; R141061-62, Emeti, Western Province, PNG; R146039, Erare, Southern Highlands Province, PNG; R150866, 30km N, 14 km W Kikori, Kikori River, Gulf Province, PNG.

***Sphenomorphus buettikoferi* (van Lidth de Jeude, 1905)**
Material examined: 3 specimens, RMNH.RENA 4471, 30753-54 (syntypes), Mount Liang Koeboeng, Borneo [= Gunung Liang Kubung, Sintang Regency, West Kalimantan].

***Sphenomorphus capitolythos* Shea, Michels, 2008**
Material examined: 1 specimen, RMNH.RENA 5088 (holotype), Elat, Gross-Kei [= Elat, Pulau Kei Besar, Southeast Maluku Regency].

***Sphenomorphus consobrinus* (Peters, Doria, 1878)**
Material examined: 23 specimens, MSNG 27875 (n = 7, syntypes), SMF 14455, MCZ 33531 (ex SMF), Batjan [= Pulau Bacan]; SMF 14457-58, 14460, Patani, [Central Halmahera Regency], Halmahera; USNM 159970, Wama airstrip, [Pulau] Morotai, 237660, Jikodolong, Pulau Obi; BYU 7598-7600, 7789, 8896, MCZ 93394-95 (ex BYU 7735, 7742, respectively), CAS SU11958 (ex BYU), CM 25531, Pulau Morotai.

***Sphenomorphus loriae* (Boulenger, 1897)**
Material examined: 8 specimens, BMNH 1946.8.3.39 (formerly 97.12.10.26, syntype), MSNG 29114a-b (syntypes), Moroka, Central Province, PNG; UPNG 1028-32, Efogi, Central Province, PNG.

***Sphenomorphus maindroni* (Sauvage, 1879)**
Material examined: 7 specimens, MNHP 5267 (holotype), Haas [= Wasei, Sorong Regency, Doberoi Peninsula]; MSNG unregistered, Sorong, [Doberai Peninsula]; RMNH.RENA 7296, Fak Fak; 29879, Erokwari [= Erokwero, Doberai Peninsula]; 29880, Pasir Poetih, Manokwari, [Doberai Peninsula]; 29881, Base, Biak I. [= Pulau Biak]; 30146, Ajamaroe [= Ayamaru].

***Sphenomorphus oligolepis* (Boulenger, 1914)**
Material examined: 6 specimens, BMNH 1946.8.3.47-48 (formerly 1913.10.31.175-176, syntypes), Mimika River; RMNH.RENA 10364, Boven-Digoel [= Tanah Merah, Boven-Digoel Regency], 18365, Bivak I., Lorentz River [= Pulau Bivak, Sungai Unir, Asmat Regency], 29877, Takum, Kamp Nijob [= Nyop, Takum River, Boven-Digoel Regency], 29978, Tanah Merah, [Boven-Digoel Regency].

***Sphenomorphus rufus* (Boulenger, 1887)**
Material examined: 1 specimen, BMNH 1946.8.16.92 (formerly 82.8.29.186, holotype), Wokan, Aru Islands [= Pulau Wokam, Kepulauan Aru Regency].

***Sphenomorphus solomonis* (Boulenger, 1887)**
Material examined: 33 specimens, RMNH.RENA 42826, 48360-66, Ajamaroe [= Ayamaru]; 42827, 15 km E of Ajamaroe; 47829-30, Seta, [= Setta, Maybrat






Regency, Doberai Peninsula]; 48335, Manokwari, [Doberai Peninsula]; 48336, 48353-55, Djidmaoe [= Jitmau], 15 km E of Ajamaroe, [Maybrat Regency, Doberai Peninsula]; 48337, Kotjewere [= Kotjewer, Doberai Peninsula]; 48338, Komara, [Doberai Peninsula]; 48339, 48343, Base, Biak I. [= Pulau Biak]; 48341, Erokwera [= Erokwero, Doberai Peninsula]; 48342, Ambaidiroe [= Ambiadiru, Pulau Yapen]; 48344-49,48386-87, Seroei [= Serui, Pulau Japen]; 48352, Kamboeaja [= Kambuaya, Maybrat Regency, Doberai Peninsula]; 48356-57, Kameri, Noemfoor I. [= Pulau Numfoor].

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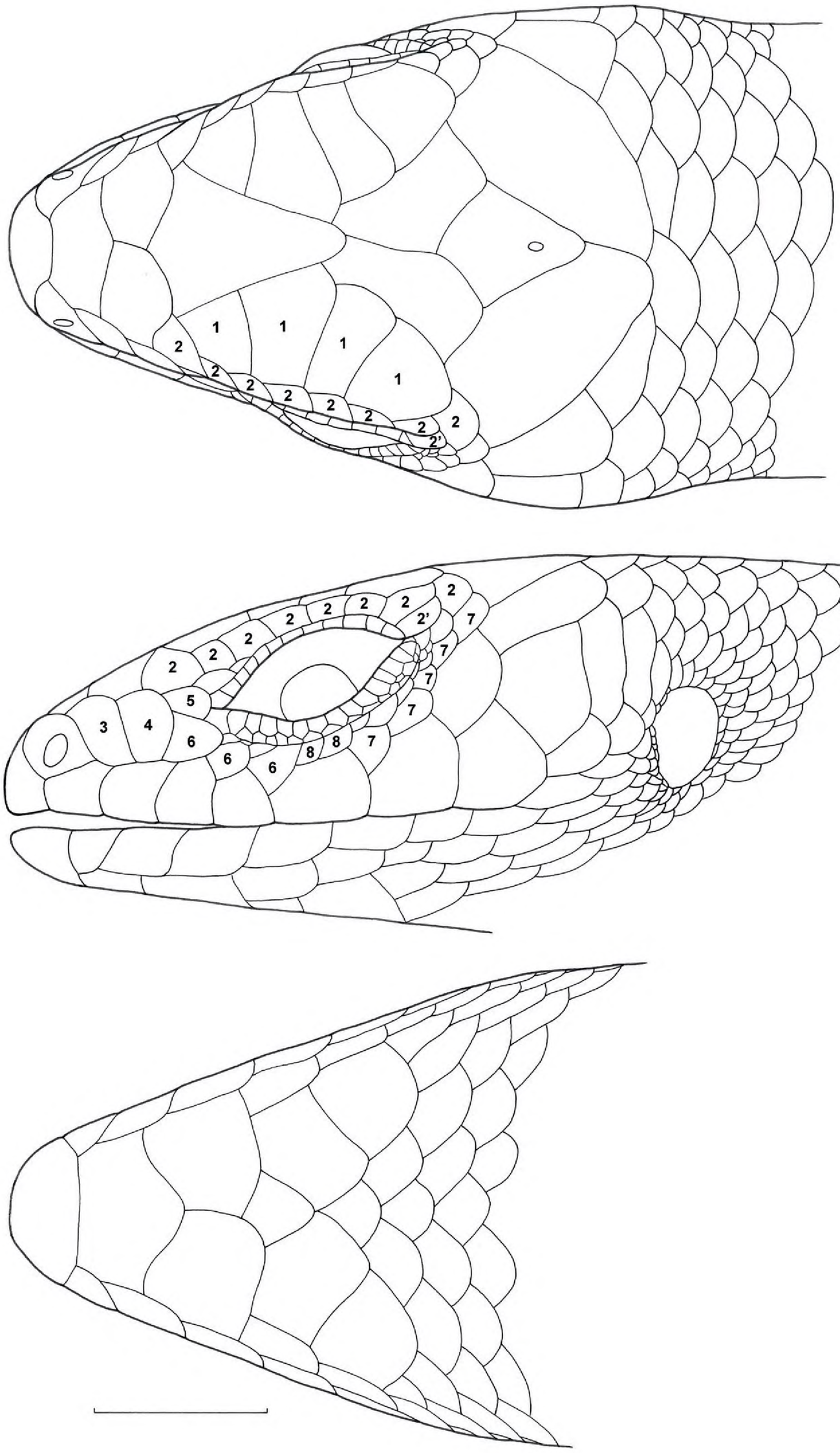


Figure 3. Head shields of *Sphenomorphus consobrinus* (Peters et Doria, 1878) (SMF 14457). Circumocular scalation identified by same numbers as in Fig. 1 [scale bar 2 mm].



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Xantholinini of the Australasian Region (Coleoptera: Staphylinidae), X. New species and new records from New Guinea and Australia

272˚ contribution to the knowledge of the Staphylinidae

Arnaldo Bordoni

Museo di Storia Naturale dell'Università di Firenze, sezione di Zoologia "La Specola", via Romana 17, I-50125, Firenze, Italy; e-mail: arnaldo.bordoni@fastwebnet.lt

Abstract: In this contribution the following species are described and illustrated for the cited regions: *Thyreocephalus alveolatus* sp. nov. (Papua New Guinea), *T. litoreus* sp. nov. (Papua New Guinea), *T. oculeus* sp. nov. (Australia), *Eachamia karkar* sp. nov. (Papua New Guinea), *Mitomorphus okapaensis* sp. nov. (Papua New Guinea), and *Andelis guineanus* sp. nov. (Papua New Guinea). New records are listed; *Guineodinella hornabrookiana* Bordoni, 2010 is newly recorded for Papua New Guinea.

Key words: Coleoptera, Staphylinidae, Xantholinini, new species, new records, *Thyreocephalus*, *Eachamia*, *Mitomorphus*, *Andelis*, Australasian Region.

Introduction and material

In the material received in study from some institutions and private collections, I found several species of Xantholinini from the Australasian Region. An important part comes from the Naturhistorisches Museum in Basel and from the Manchester Museum, through the useful collaboration respectively of Matthias Borer and Dmitri Logunov. In particular, Logunov sent me specimens from Last's collection and found the essential localities indications in a notebook of this author. Last has studied some specimens collected by R. Hornabrook in New Guinea often with erroneous identifications (Last 1980). Some other of his species have remained in litteris, preserved in the Manchester Museum. Numerous species have been described in the revision of the Xantholinini of this island and surrounding islands (Bordoni 2010). Others are described in these pages.

All label text is reproduced as in originals. All taxa are listed systematically.

Abbreviations used in the text:

CAB – collection Bordoni, Firenze, Italy;
CTI – collection Ito, Kyoto, Japan;
CJN – collection Nunn, Dunedin, New Zealand;
ISBD – Institute of Systematic Biology, Daugavpils, Latvia;
MM – Manchester Museum, United Kingdom;
NHMB – Naturhistorisches Museum Basel, Switzerland;
NMW – Naturhistorisches Museum Wien, Austria;

ex. – specimen;
exx – specimens;
Isl. – island(s);
m – meter;
Papua NG – Papua New Guinea (country);
riv. – river;
vill. – village.

Taxonomic part

Thyreocephalus flavus Last, 1980

Examined material: 2 exx NHMB: Papua NG, Madang prov., Ohu vill., near Gum, 5.13S, 145.41E, 150 m, L. Cizek I-II.2001; 2 exx CAB: same data.

Distribution: The species is known from Indonesian New Guinea (Cyclops Mts.) and Papua NG (Morobe, Madang) (Bordoni 2010).

Thyreocephalus taitiensis (Boheman, 1858)

Examined material: 1 ex. ISBD: W Papua, S Bird's Neck, Kaimana, 40 km E Triton Bay, Lobo vill. 03°44'08S, 134°05'40E, M.Kalniņš 16.IX.2010; 1 ex. NHMB: Papua NG, Madang prov., Baitabag vill. 50 m, 5.08S, 145.46E,





L. Cizek VI-VII.1999.

Distribution: Tahiti, Samoa, New Caledonia, Hebrides, Aru, Bismarck, Solomon, New Guinea (Bordoni 2010) and New Zealand (introduced) (Bordoni 2005b).

***Thyreocephalus volubilis* Bordoni, 2010**
Examined material: 2 exx MM: Papua NG, Okapa, R. Hornabrook VII.1965.

Distribution: This species is known from Papua NG and Normamby Isl. (Bordoni 2010).
Note: The specimens bear the label "*Thyreocephalus vulgaris* Last, Paratype" (in litteris).

***Thyreocephalus onerunkanus* Bordoni, 2010**
Examined material: 1 ex. MM: Papua NG, Morobe Prov., Wau, 1100 m, 7.20S, 146.43E, L. Cezek 25-28. IX.2000.

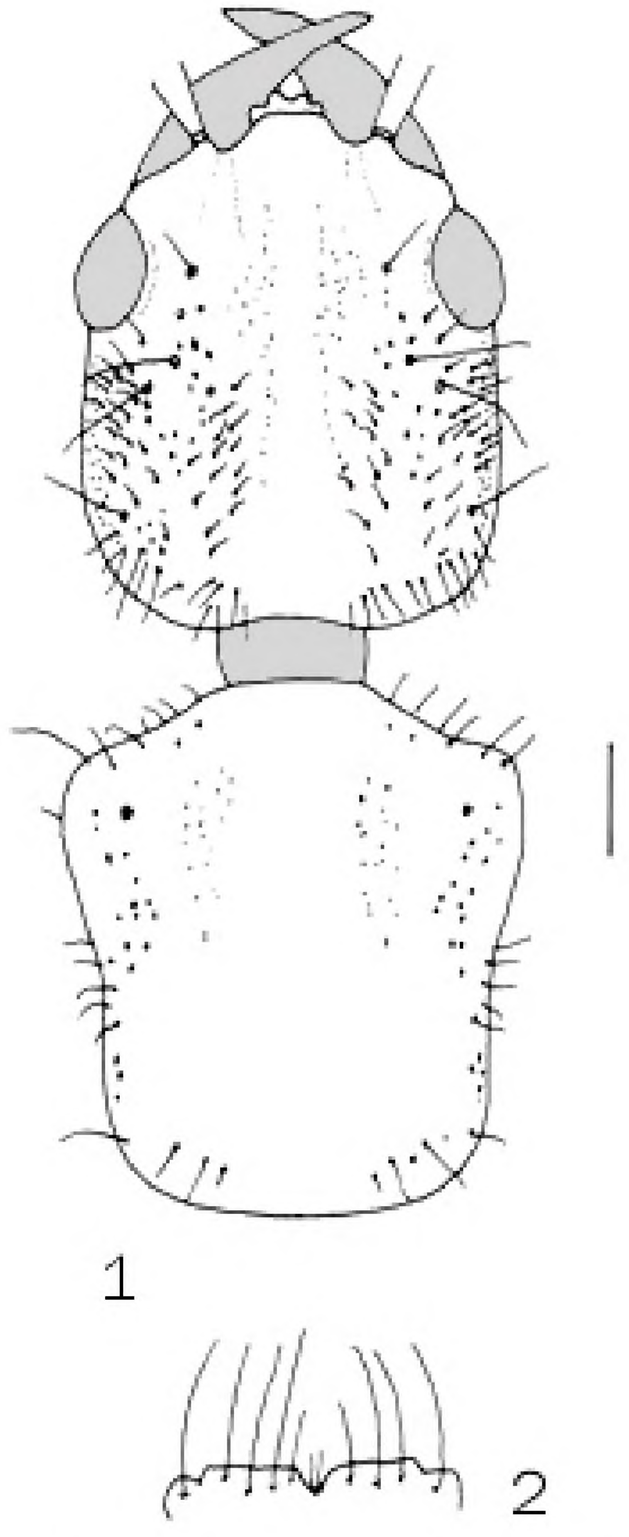
Distribution: This species is known from Papua NG (Bordoni 2010).

***Thyreocephalus alveolatus* sp. nov.** (Figs 1-2)
Holotype ♀ MM: Papua NG, (East Sepik prov.), Blackwater riv., R, Hornabrook VI.1974 (MM).
Paratypes 3 exx: 2♀ MM & 1♀ CAB: same data as in holotype.

Derivatio nominis: The specific epithet refers to the Latin "alveolatus" (- a -um) - hollowed, in relation to the puncturation on head.
Description: Length of body 16 mm; from anterior margin of head to posterior margin of elytra: 9 mm. Body black with reddish brown elytra and darker scutellum; last three visible abdominal segments reddish. Head sub-rectangular, proportionally small, with a little rounded sides and largely rounded posterior angles. Eyes large, slightly protruding. Head and pronotum and related puncturation as in Fig 1. Labrum as in Fig. 2. Puncturation of head deep and dense, almost forming striae, with long yellowish setae, especially on the sides. Elytra sub-rectangular, longer than pronotum, narrower than it at the anterior angles, with marked humeral angles. Surface with dense, deep puncturation, arranged in numerous series.
Distribution: The species is known only from the type locality.
Note: The holotype specimen bears the label "*Thyreocephalus alveus* Last, Paratype" (in litteris). The species is isolated between the *Thyreocephalus* Guérin-Méneville, 1844 from New Guinea by the colouration and by the puncturation of head and elytra.

***Thyreocephalus litoreus* sp. nov.** (Figs 3-7)
Holotype ♂ NHMB: Papua NG, Madang prov., Ohu vill., near Gum, 150 m, 5.13S, 145.41E, L. Cizek VI.2001.

Derivatio nominis: The specific epithet refers to the Latin "litoreus" (-a -um) - coastal, in relation to the type locality, near the sea.
Description: Length of body 12.5 mm; from anterior margin of head to posterior margin of elytra: 7 mm. Body robust, broad, black with red elytra, black scutellum, reddish brown dark abdomen; 6th visible abdominal segment and genital segment reddish; head with bronze reflexes; antennae reddish with yellowish last four segments; reddish legs. Head and pronotum and related puncturation as in Fig. 3. Labrum as in Fig. 4. Clypeus and lateral portion of pronotum whit wrinkled oblique striature. Elytra sub-rectangular, longer and wider than pronotum, with sub-parallel and sub-rectilinear sides and marked humeral angles. Surface with superficial traces of transverse micro-striation and



Figures 1-2. *Thyreocephalus alveolatus* sp. nov., ♀.
1 – Forebody; 2 – Labrum [scale bar 0.5 mm].

large, superficial, dense puncturation. Tergite and sternite of the male genital segment as in Figs 5-6. Aedeagus (Fig. 7) 1.92 mm long, ovoid elongate, with prominent median lobe; parameres long and arched; inner sac tape-like, covered with fine spinulae.

Distribution: The species is known only from the type locality.

Note: This species is the only *Thyreocephalus* on New Guinea with red elytra, apart from the introduced *T. australis* Bordoni, 2005 that differs evidently by the shape and size of the body, puncturation of elytra, and by the aedeagus.

***Thyreocephalus arnhemensis* Bordoni, 2005**

Examined material: 1 ex. CAB: Australia, NT, Victoria river, Roadhouse, leg. ? 9.X.2012; 1 ex. CJN: NT, Darwing, Conawarra, leg. ? 29.IX-3.X.2011; 1 ex. CJN: QLD, Revernshoe, Archer river, leg. ? 4.IX.2011.

Distribution: This species is known from Northern Territory, North of Western Australia and North Queensland (Bordoni 2005a).

***Thyreocephalus oculeus* sp. nov.** (Figs 8-12)

Holotype ♂ NHMB: Australia, North QLD, Lyons Lookout Massman (Cairns), G. Minet II-VIII.1988.

Paratype 1♀ CAB: same data as in holotype.

Derivatio nominis: The specific epithet refers to the Latin "oculeus" (- a -um) - sharp-eyed, in relation to the very big eyes.

Description: Length of body 13 mm; from anterior margin of head to posterior margin of elytra: 7 mm. Body reddish brown dark, with reddish lateral margins and humeral angles of elytra; posterior margin of 6th visible abdominal segment and genital segment yellowish; antennae reddish brown with yellowish last three segments; legs reddish brown. Head rounded, with very large and almost flat eyes. Clypeus with longitudinal micro-striature; all the surface of head with fine micro-puncturation. Head and pronotum and related puncturation as in Fig. 8. Labrum as in Fig. 9. Elytra sub-quadrate, as long as pronotum, dilated forward, where they are a little wider than pronotum, with rounded humeral angles. Surface with numerous, fine, dense punctures, arranged in numerous, closed series. Abdomen with evident, dense puncturation. Tergite and sternite of the male genital segment as in Figs 10-11. Aedeagus (Fig. 12) 1.88 mm long, ovoid elongate, with slightly prominent, long median lobe; parameres narrow and arched; inner sac tape-like, long and narrow, covered with fine spinulae.

Distribution: The species is known only from the type locality.

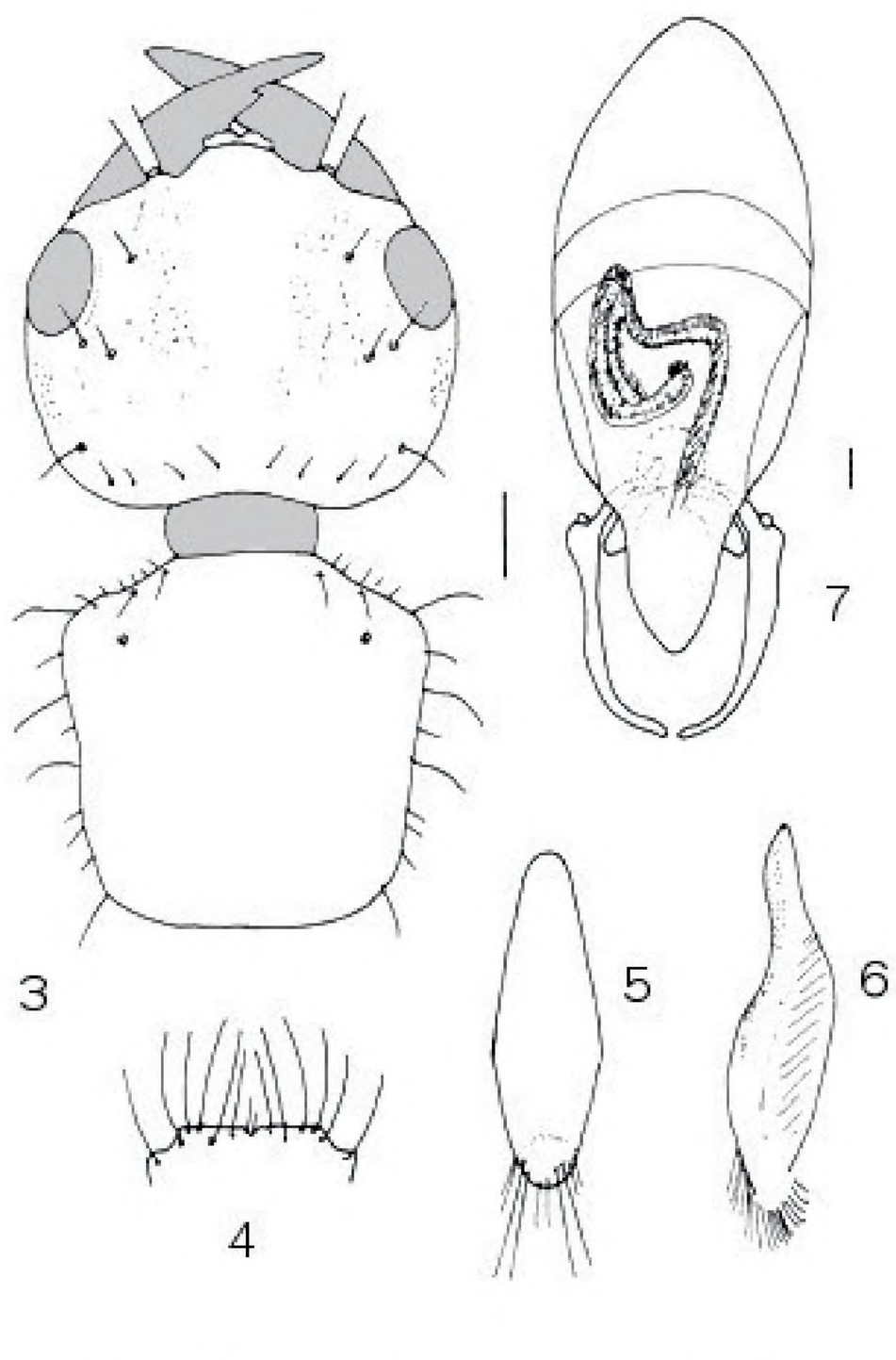
Note: This species is related to *Thyreocephalus volubilis* Bordoni, 2005 (Papua NG & Normanby Is.) for some external characters but differs from the congenerics of the Australasian Region by shape and size of eyes, puncturation, colouration, and aedeagus.

***Guineodinella gigantula* (Bernhauer, 1915)**

Examined material: 1 ex. CTI: Irian Jaya, Duebey meni, Mts Arfak, 1300 m, K. Sakamaki V.2011; 1 ex. NHMB: Papua NG, Bulolo, J. Sedlacek II.1972; 1 ex. NHMB: same data, 11.II.1974.

Distribution: This species is known from Indonesian New Guinea and Papua NG (Bordoni 2010).

Note: All the cited specimens, in poor conditions, are labelled "*Thyreocephalus hornabrooki* Last" (in litteris). The genus *Guineodinella* was described (Bordoni 2010) for some species of New Guinea, previously referred to *Thyreocephalus*.



Figures 3-7. *Thyreocephalus litoreus* sp. nov., ♂.
3 – Forebody [scale bar 0.5 mm]; 4 – Labrum; 5 – Tergite of the male genital segment; 6 – Sternite of the same; 5 – Aedeagus [scale bar 0.1 mm].



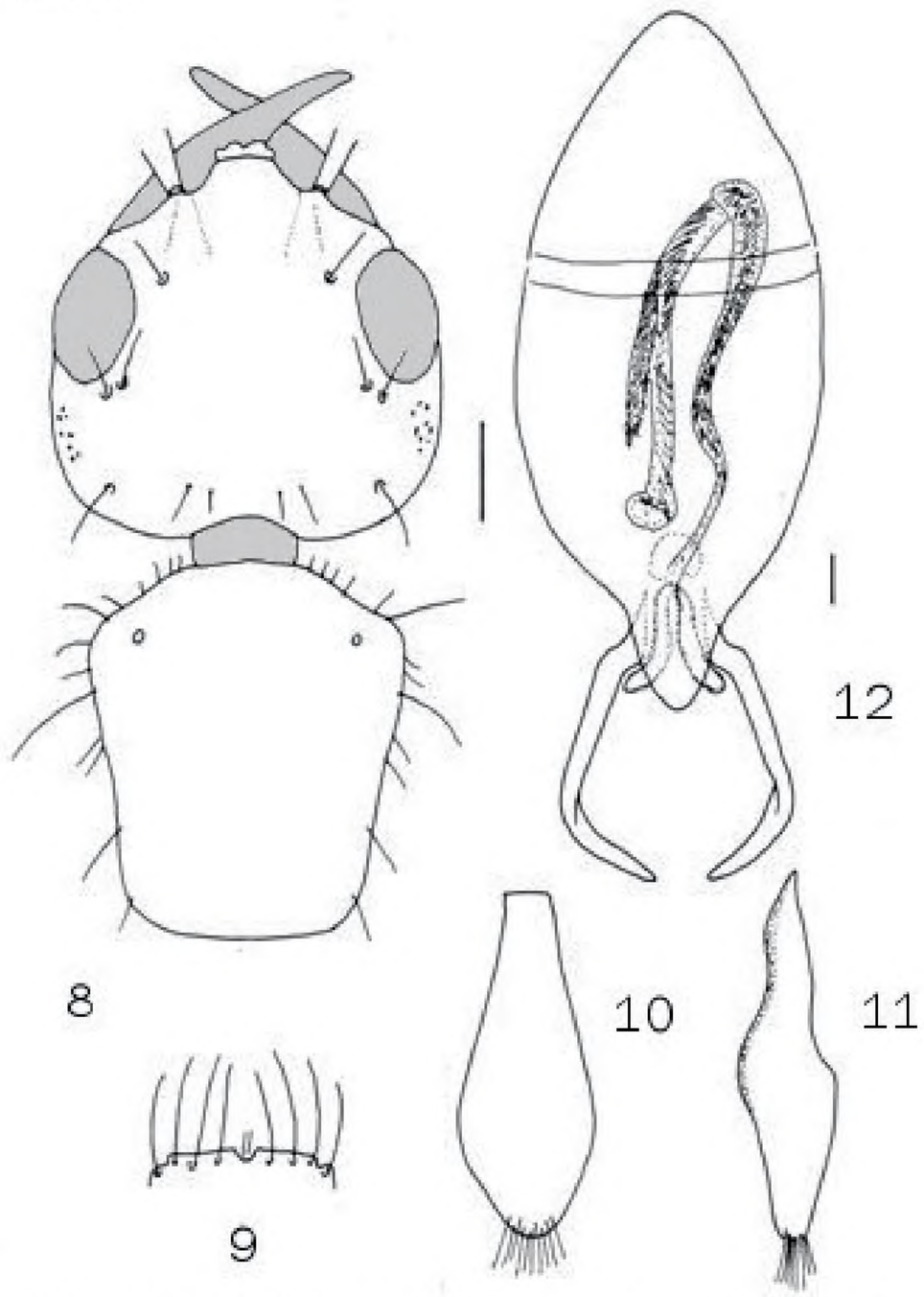
***Guineodinella hornabrookiana* Bordoni, 2010**
Examined material: 1 ex. CAB: Papua NG, Noman Chimba, Hornabrook VIII.1972; 1 ex. MM: Papua NG, Marifunga, R. Hornabrook 25.IV.1972; 1 exx MM: same data, Asaro-Chimbu Divide, R. Hornabrook 25.IV.1972.

Distribution: This species was known only from Indonesian New Guinea (Bordoni 2010) until now. New record for Papua NG.

***Paracorynus arecae* (Broun, 1880)**
Examined material: 1 ex. NMW, New Zealand, Nelson, Reitter.

Distribution: This species is known from New Zealand, especially in North Island (Bordoni 2005b).

***Eachamia karkar* sp. nov.** (Figs 13-16)
Holotype ♂ MM: Papua NG, Karkar Isl., R. Hornabrook X.1968.
Paratypes 7 exx: 1♀ MM: same data as in holotype; 1♀ CAB: same data as in holotype but 4.V.1969; 1♂ CAB: (Kimbu prov.), Karimui, R. Hornabrook 19.III.1966; 1♀ MM: Marifunga (Chimbu-Asaro), R. Hornabrook 27.II.1971; 1♀ MM: (Morobe prov.), Saruwaged Range, R. Hornabrook II.1966; 1♂, 1♀ MM: Okapa, R. Hornabrook 6.II.1965.



Figures 8-12. *Thyreocephalus oculeus* sp. nov., ♂.
8 – Forebory [scale bar 0.5 mm]; 9 – Labrum; 10 – Tergite of the male genital segment; 11 – Sternite of the same; 12 – Aedeagus [scale bar 0.1 mm].

Derivatio nominis: The specific epithet refers to the type locality, as a noun in apposition.
Description: Length of body 14 mm; from anterior margin of head to posterior margin of elytra: 7 mm. Large species, characterized by bronze reflexes and big head. Body uniformly reddish brown, with evident bronze reflexes; last four antennomeres yellowish pale. Head broad, sub-quadrate, with largely rounded posterior angles. Eyes large, a little protuberant. Surface of head shiny, with longitudinal micro-striature on clypeus, with a big puncture near the anterior margin of eyes and 2 punctures below the eyes; some punctures near the posterior margin. Labrum as in Fig. 13. Pronotum massive, longer than head, as wide as it. Surface shiny, with the usual puncture near the anterior angles. Surface with dense, deep, minute puncturation, arranged in numerous series. Abdomen with transverse micro-striature and evident, not sparse puncturation. Tergite and sternite of the male genital segment as in Figs 14-15. Aedeagus (Fig. 16) 1.66 mm long, ovoid, with a little prominent median lobe; parameres short, arched and narrow; inner sac tape-like, narrow and long, covered with fine spinulae.
Distribution: The species is known only from the type locality.
Note: This species differs from the congeneric by big size, shape of eyes, and aedeagus.

***Mitomorphus punctatissimus* Bordoni, 2010**
Examined material: 1 ♂ MM, Papua NG, (Western prov.), Tububil, R. Hornabrook 15.X.1971.

Distribution: The species is known from Papua NG (Madang, Morobe, Eastern Highlands) (Bordoni 2010).
Note: The specimen bears the label "*Xantholinus hornabrooki* Last / Paratype" (in litteris).

***Mitomorphus okapaensis* sp. nov.** (Figs 17-19)
Holotype ♂ MM: Papua NG, Okapa, R. Hornabrook 11.VII.1965
Paratypes 3 exx: 1♀ CAB & 1♀ MM: same data as in holotype; 1♀ MM: same data as in holotype but 25.IX.1965.

Derivatio nominis: The specific epithet refers to the type locality.
Description: Length of body 5 mm; from anterior margin of head to posterior margin of elytra: 2.8 mm. Body entirely reddish brown dark, with testaceous antennae and legs. Very similar to *M. budemuensis* Bordoni, 2010 (Papua NG: Finisterre Mts.) in the external characters but shorter, with

sub-ovoidal head with more rounded sides; eyes a little protruding; elytra sub-quadrate, with very fine puncturation, arranged in three series, one juxtasutural, one median and one lateral. Tergite and sternite of the male genital segment as in Figs 17-18. Aedeagus (Fig. 19) 0.96 mm long, ovoid elongate, with asymmetric parameres; inner sac with two parallel series of short spines.

Distribution: The species is known only from the type locality.

Note: The specimens bear labels "*Mitomorphus saltus* Last / Paratype" (in litteris).

***Andelis guineanus* sp. nov.** (Figs 20-23)

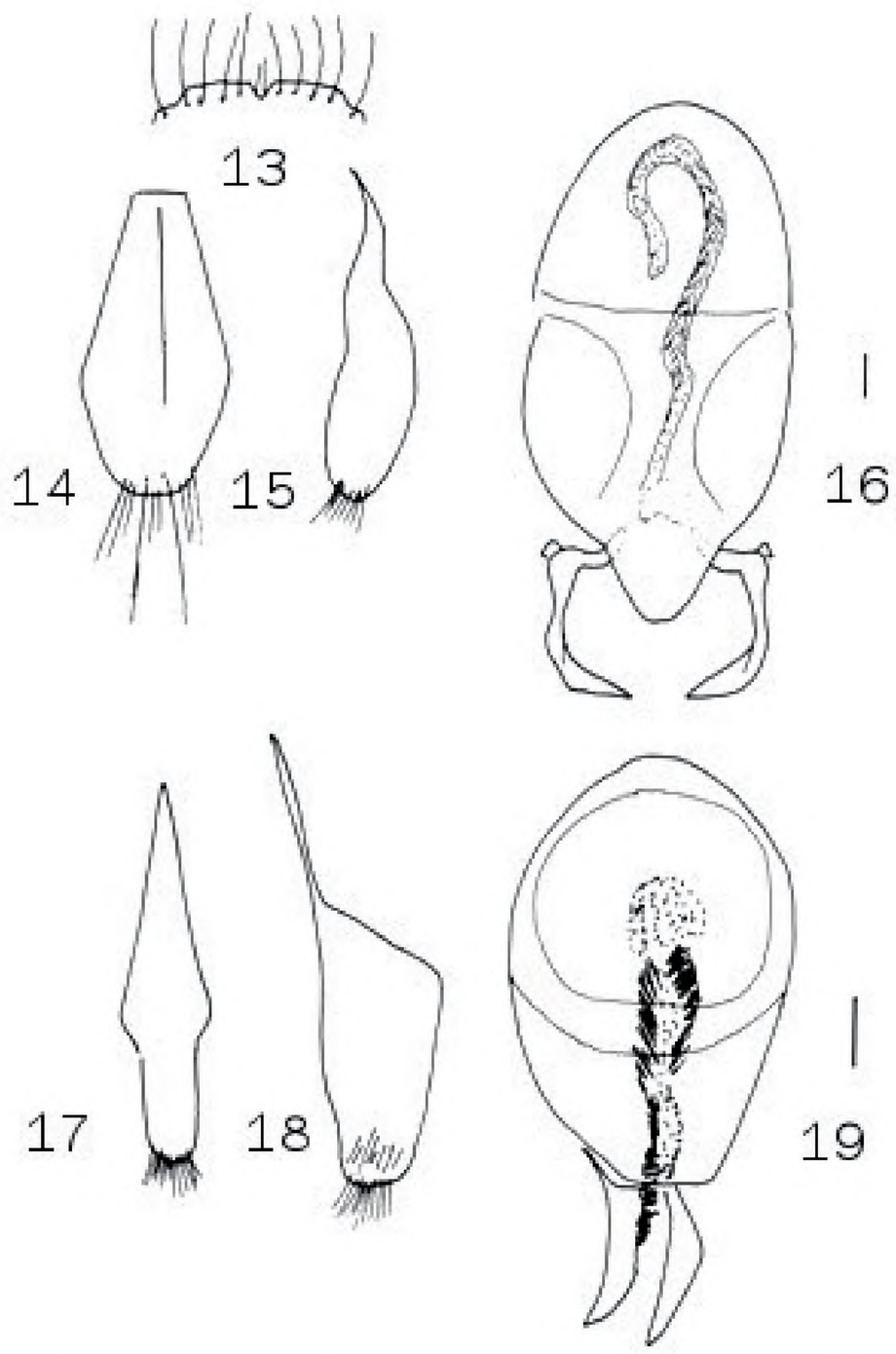
Holotype ♂ MM: Papua NG, Okapa prov., Oriana, R. Hornabrook 8.XII.1972.

Paratype 1♂ CAB: same data as in holotype.

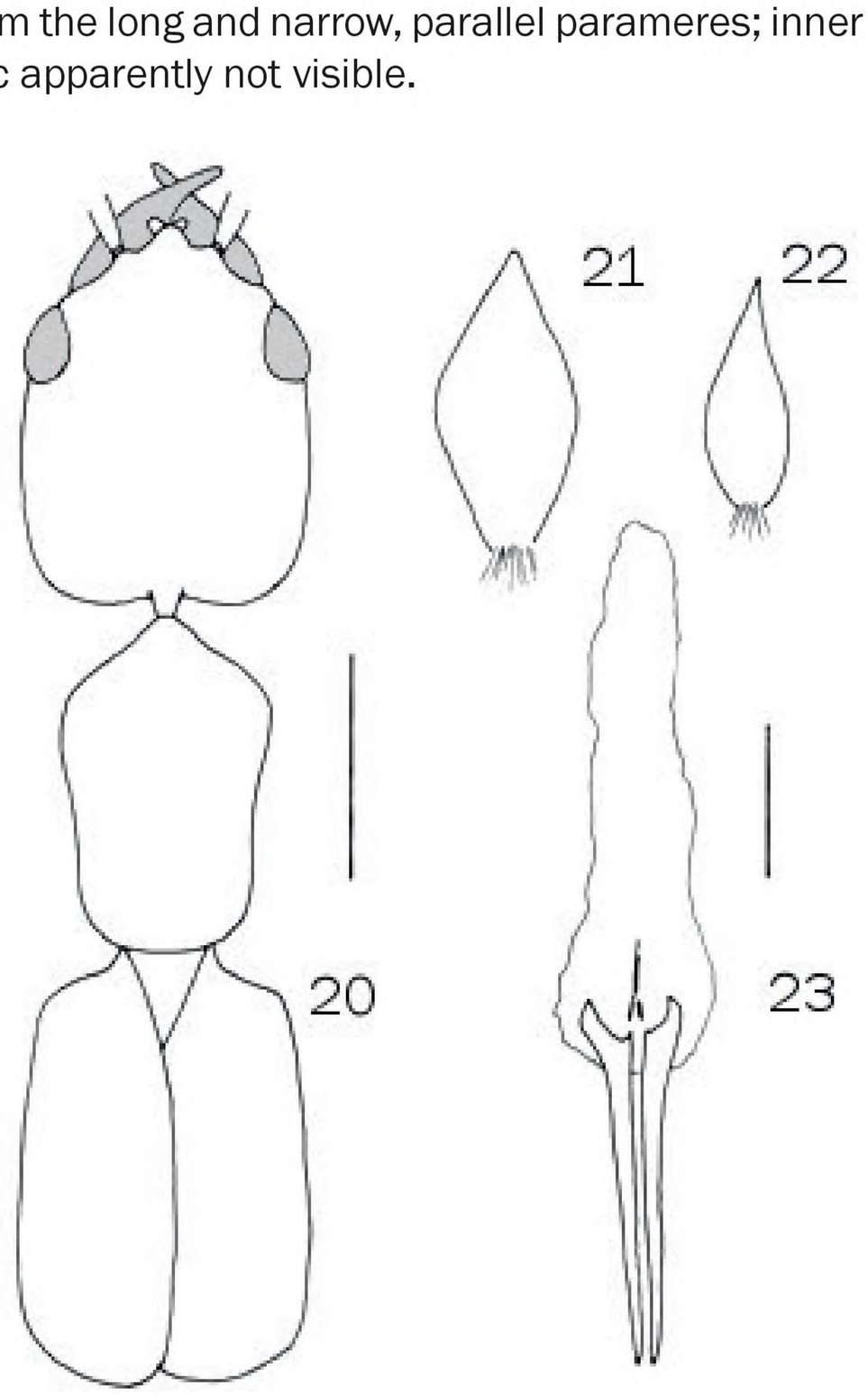
Derivatio nominis: The specific epithet refers to New Guinea.

Description: Length of body 4.4 mm; from anterior margin of head to posterior margin of elytra: 2.6 mm.

Body (Fig. 20) characterized by the reddish brown colouration, with black head, by the very narrow neck, the very evident, dense puncturation of head. Head proportionally large, convex, sub-rectangular, with slightly rounded sides, and largely rounded posterior angles. Eyes small, a little protuberant. Surface of head with deep, regular, areolate, dense puncturation, apart from the clypeus, lateral portion and a narrow median band. Pronotum small, very narrow, much narrower and shorter than head, with oblique anterior margins, rounded anterior angles, and sinuate sides. Surface with superficial transverse micro-striation and with superficial numerous but not dense puncturation, apart from a median band. Elytra very large and long, longer and wider than pronotum, a little dilated posteriad, with marked humeral angles. Surface with very fine, dense punctation, arranged in numerous series. Abdomen with transverse micro-striature and sparse puncturation. Tergite and sternite of the male genital segment as in Figs 21-22. Aedeagus (Fig. 23) 0.55 mm long, totally membranous, apart from the long and narrow, parallel parameres; inner sac apparently not visible.



Figures 13-19. Xantholinini from New Guinea. 13-6: *Eachamia karkar* sp. nov., ♂. 13 – Labrum; 14 – Tergite of the male genital segment; 15 – Sternite of the same; 16 – Aedeagus [scale bar 0.1 mm]; 17-19: *Mitomorphus okapaensis* sp. nov., ♂. 17 – Tergite of the male genital segment; 18 – Sternite of the same; 19 – Aedeagus [scale bar 0.1 mm].



Figures 20-23. *Andelis guineanus* sp. nov., ♂. 20 – Forebody and elytra [scale bar 0.5 mm]; 21 – Tergite of the male genital segment; 22 – Sternite of the same; 23 – Aedeagus [scale bar 0.1 mm].

Distribution: The species is known only from the type locality.

Note: These specimens bear labels "*Mitomorphus punctatus* Last / Paratype" (in litteris). As in other cases, the specimens do not bear labels of locality but a symbol that correspond to indications tracked on a notebook of Last. The locality is recognized by the useful collaboration of the colleague Logunov of the Manchester Museum. Only one species (*Andelis minutulus* Bordoni, 2010) from Solomon Isl., different in size, colouration, shape of the body, aedeagus, is known from the Papuan Region (Bordoni 2010). The new species is the first *Andelis* Bordoni, 2002 known from New Guinea.

Acknowledgements

I wish to thank the colleagues for providing the material to this study: M. Borer (Naturhistorisches Museum Basel, Switzerland), T. Ito (Kyoto, Japan), D. Logunov (Manchester Museum, Manchester, United Kingdom), J. Nunn (Dunedin, New Zealand), H. Schillhammer (Naturhistorisches Museum Wien, Austria), and A. Shavrin (Institute of Systematic Biology, Daugavpils, Latvia).

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The Bryocorinae, Cylapinae, Deraeocorinae and Mirinae (Insecta: Heteroptera: Miridae) from Baiteta Forest, Papua New Guinea, with a discussion of their feeding habits and a list of species of the country

Frédéric Chérot [1], **Jacek Gorczyca** [2], **Michael D. Schwartz** [3] & **Thierry Demol** [1]

1 Département de l'Etude du Milieu naturel et agricole, DGO3 Agriculture, Ressources naturelles et Environnement, Service public de Wallonie, 23 avenue Maréchal Juin, B-5030, Gembloux, Belgique; e-mails: frederic.cherot@spw.wallonie.be (*Corresponding author*), thierry.demol@spw.wallonie.be
2 University of Silesia, Department of Zoology, Bankowa 9, PL-40-007, Katowice, Poland; e-mail: jacek.gorczyca@us.edu.pl
3 Research Associate, Division of Invertebrate Zoology, American Museum of Natural History c/o: Agriculture and Agri-Food Canada, K1A 0C6, Ottawa, Ontario, Canada; e-mail: mds81052@hotmail.com

Abstract: The Bryocorinae, Cylapinae, Deraeocorinae and Mirinae (Miridae) of Baiteta Forest, a coastal forest of Madang Province, eastern Papua New Guinea, are studied. Three genera and seven species are described as new: *Baitetacoris turschi* gen. nov., sp. nov., *Carpinterocoris brailovskyi* gen. nov., sp. nov., *Missacoris sigwaltae* gen. nov., sp. nov., *Peritropis graziae* sp. nov., *Prolygus ehannoi* sp. nov., *Prolygus polhemusorum* sp. nov. and *Sabactiopus zhengi* sp. nov. The following new combinations are established: *Diognetus pilosus* (Poppius, 1914a) new combination and *Sabactiopus formosus* (Distant, 1904a) new combination. A lectotype is designated for *Diognetus intonsus* Distant, 1904c, valid name and for *Diognetus lituratus* (Distant, 1909b) new junior synonym. *Garainamiris antennatus* Carvalho, 1981b is transferred from the tribe Deraeocorini to the tribe Saturniomirini new tribal assignment (Deareocorinae). *Guisardinus neoguineanus* Carvalho in Carvalho & Gross, 1979 and *Palaucoris novaguineae* (Ghauri, 1975) are redescribed, as the male genitalia of *Eurystylus costalis* Stål, 1871. The Female genitalia of *Aristopeplus divisus* (Walker, 1873b), *Aristopeplus imperialis* Poppius, 1912a, *Garainamiris antennatus* Carvalho, 1981b, *Eurystylus costalis* Stål, 1871, *Imogen fasciatus* Carvalho, 1983, *Imogen papuensis* Carvalho, 1983, *Macrolygus rubrus* (Carvalho, 1987b), *Macrolygus viridulus* Yasunaga, 1992, *Palaucoris novaguineae* (Ghauri, 1975), *Prolygus erimensis* (Poppius, 1914a), *Warrisia huonensis* (Poppius, 1914b), *Waucoris keyensis* (Poppius, 1915a), *Waucoris longipes* (Poppius, 1915a) and *Waucoris papuanus* (Poppius, 1915a) are described for the first time. A key is provided for the species of *Macrolygus* Yasunaga, 1992 and for the Papuan *Waucoris* Carvalho, 1987b. The host-plants of the Miridae specimens collected in Baiteta Forest are analysed and a list of the species of the four subfamilies known from Papua New Guinea is given. The following species are cited for the first time from continental Papua New Guinea: *Argenis incisuratus* (Walker, 1873b), *Bertsa lankana* (Kirby, 1891), *Diognetus intonsus* Distant, 1904c, *Eurystylus costalis* Stål, 1871 and *Peritropis sulawesica* Gorczyca, 2006b.

Key words: Heteroptera, Miridae, Baiteta Forest, Papua New Guinea, new species, new combinations, male and female genitalia, host plants.

Introduction

The Miridae (Insecta: Heteroptera) of Papua New Guinea remain relatively poorly known. Numerous genera and species were described from this area since the second half of XIXth century, generally on a small number of specimens. The main works including the descriptions of these Miridae from Papua New Guinea and Papua Barat or Irian Jaya are the following: Carvalho (1956, 1981a, 1984a-c, 1985, 1986a-d, 1987a-d, 1988), Carvalho & Afonso (1977), Carvalho & Gross (1979), Carvalho & Lorenzato (1978), Carvalho & Wallerstein (1977), Distant (1904c, 1910b), Ghauri (1975), Gorczyca






(2002, 2006b), Menard & Schuh (2011), Poppius (1909, 1912a & b, 1914b, 1915a), Schuh (1984), Stonedahl (1988b), Stonedahl & Cassis (1991), Tatarnic & Cassis (2008), and Walker (1873a & b).

Moreover, a large part of these species are only known by their original description and we do not have any accurate information about their biology or distribution. Synthetic works up to the generic level are frequently lacking and the type material is dispersed in numerous museums around the World.

We provide hereafter the analysis of a collection made in a limited 1 km^2 area of the centre of Baiteta Forest (05°01'S, 145°45'E, Madang Province, Papua New Guinea), mainly preserved at the Institut royal des Sciences naturelles de Belgique, Brussels, Belgium (ISNB). Data on host plants – identification by P. Katik, Lae Herbarium – of numerous specimens are available. We take advantage of this information (summarised in the table 2) to discuss the feeding habits of the studied species. In addition to the specimens of Baiteta Forest, we include also in our work the specimens of some interesting Papuan species collected by the ISNB's team in Iwam Pass.

Baiteta Forest is a remnant of lowland (50 m a.s.l.) mixed rainforest, 4 km inland from the north-eastern coast of Papua New Guinea and about 40 km north of Madang town (Versteirt et al. 2008), lying on a bed of calcareous lithic arenite, with some raised coral reefs (Missa 2000). This region is classified as tropical rainy with no true dry season and has an average annual precipitation of about 3558 mm. The humidity is always high, the winter months (June to September) being the driest. The annual mean temperature is 26.5°C (values from meteorological station of Madang) (Bowman et al. 1990).

A more detailed description of Baiteta village and its neighbouring areas is available in Bowman et al. (1990).

Iwam Pass lies in the Bismarck Range, a mountain range in the central highlands of Papua New Guinea, at the border of Madang, Simbu, and Western Highlands Provinces.

Materials and methods

Collection methodology for analysed specimens

The analysed specimens were collected by an ISNB team led by Dr Olivier Missa during four sampling periods (March-June 1993, March-June 1994, April-August 1995 and April-July 1996) covering the end of the relatively wet and the beginning of the relatively dry seasons, by canopy fogging and UV light trapping (Novotny & Missa 2000; Versteirt et al. 2008). The two first campaigns were done on individual trees with large discrete crowns while during the two last campaigns, trees with intermingled crowns were sampled (Versteirt et al. 2008).

One hundred and thirteen samples were obtained by fogging the crown of 40 identified (and 33 unidentified) trees with Reslin Premium insecticide mixed with diesel (Missa 2000; Novotny & Missa 2000) (cf. Table 2 part 1 in Annex). The specimens were collected in 15 to 20 one m^2 collecting surface funnels placed under the crowns. The foggings were carried out under standard weather conditions, in the early morning after a rainless night and when there was no wind, for about 20 minutes, on the whole crown area (Versteirt et al. 2008). The collecting funnels were kept in place to collect the falling insects over a period of two hours after fogging (Missa 2000).

One light trap was alternately placed in the canopy of a New Guinea or Pacific walnut *Dracontomelum dao* (Anacardiaceae) and an island lychee *Pometia pinnata* (Sapindaceae) for a total of 31 nights (from 7 pm until 6 am) in 1993. Two light traps were operated, in 1996, for a total of 110 nights (also from 7 pm until 6 am) at 40 locations previously fogged in the canopy (Missa 2000; Novotny & Missa 2000) (cf. Table 2 part 2). The light traps were the Pennsylvanian model with a roof equipped with a 15 watt ultraviolet tube powered by a 12 volt car battery (Missa 2000).

Organisation of the present work

We analyse the specimens of the following four subfamilies: Bryocorinae, Cylapinae, Deraeocorinae and Mirinae. Phylinae of the tribe Leucophoropterini were studied by Menard & Schuh (2011), the other subfamilies and tribes remaining to analyse.

In our section "taxonomy", the taxa are classified by subfamily and tribe and, in each tribe, by alphabetical order of their binomina.

The reader will find a complete holonymy [1] of the taxa studied here in Carvalho's (1957, 1959)

1 According to Dubois (2000: 91), a holonymy is a list of available and valid nomina in their original and subsequent spellings and combinations, with their junior synonyms, their subsequent usages and the afferent bibliographical references.






and Schuh's (1995) catalogues. In addition to the original descriptions, relevant subsequent taxonomical acts and those in Schuh (1995) we also provide references published after 1995. The abbreviations used in our partial holonymies are the following (according to Schuh 1995: x-xi): DV: habitus illustration, FG: Female genitalia illustration, MG: male genitalia illustration, SEM: illustration of body parts obtained with a Scanning Electron Microscope.

For each species, before the partial holonymy if present, all specimens studied from Baiteta Forest are cited in "Additional material" section, if relevant with some additional specimens used for comparison. The specimens are classified alphabetically by country, place and, for the same locality, by order of collection dates. The type specimens are cited first, their label data are given in full. In recording these label data, we use a semicolon to separate different specimens and a slash to separate the labels of each particular type specimen. The data about non-type specimens are summarised. The "FC n°" is Chérot's unique identification number affixed to some of the examined specimens.

The depositories of the cited material are abbreviated in the text as in Kerzhner & Josifov (1999):

AMNH – American Museum of Natural History, New York City, New York, U.S.A.;
ANIC – Australian National Insects Collection, Sydney, Australia;
BMNH – The Museum of Natural History, London, United Kingdom;
BPBM – Bernice P. Bishop Museum, Honolulu, U.S.A.;
CFC – collection F. Chérot, Sombreffe, Belgium;
CNC – Agriculture and Agri-food Canada, Ottawa, Canada;
HNHM – Hungarian Natural History Museum, Budapest, Hungary;
HUES – Biology Laboratory, Hokkaido University of Education, Sapporo, Japan;
ISNB – Institut royal des Sciences naturelles de Belgique, Brussels, Belgium;
MNHN – Muséum national d'Histoire naturelle, Paris, France;
MRAC – Musée royal de l'Afrique Centrale, Tervuren, Belgium;
MNRJ – Museu naçional, Rio de Janeiro, Brazil;
NHMW – Department of Entomology, Naturhistoriches Museum Wien, Austria;
ULB – Université Libre de Bruxelles, Brussels, Belgium;
US – University of Silesia, Katowice, Poland;
USNM – United States National Museum, Smithsonian Institution, Washington D.C., U.S.A.;
ZMHF – Zoological Museum University of Helsinki, Helsinki, Finland.

The geographical coordinates of collecting locality of all examined specimens are provided in Table 1 (Annex).

For the new taxa, the following sections include the description, etymology and discussion. For the other taxa, the following sections include: the discussion and a redescription or addition to the original description if relevant. The "discussion" section includes a subsection summarising the available data on distribution, host-plants, collection methodology and feeding habits. Table 2 (Annex) gathers the information about host-plant and collection methodology for all specimens of Baiteta Forest.

Plates (colour photos) of habitus are provided at the end of the book. The corresponding figures are cited in the text as "Plate 7 fig. 1" to "Plate 18 fig. 13". Black and white photos of anatomical details and drawings of genitalia are included in the text and cited as "Fig. 1" to "Fig. 169".

The terminology of the genitalia in Miridae is purely descriptive and relatively complex (Sadowska-Woda et al. 2006). It was summarised by Carpintero & Chérot (2008), Chérot (2002) and Schmitz (1968). In the present work, we use, when it is relevant, the terms of Carpintero & Chérot (op. cit.), Davis (1955), Kelton (1959), Rosenzweig (1997), Schmitz (1968), Slater (1950) or Stonedahl (1988a), and we give some frequently used synonyms to avoid ambiguity. We use the term 'diatone" for "the maximum width of head across eyes" (Schuh 1989).

Taxonomic part

Miridae Hahn, 1833
Bryocorinae Barensprung, 1860
Eccritotarsini Berg, 1883 sensu Namyatova et al. 2015

***Bromeliaemiris* Schumacher, 1919**

References: *Bromeliaemiris* Schumacher, 1919: 223, as new genus; Schuh 1995: 539, catalogue; Schuh 2002-2013, online catalogue.

Type species: *Bromeliaemiris bicolor* Schumacher, 1919, by monotypy.






***Bromeliaemiris morobensis* Carvalho, 1981a**
(Plate 7 fig. 1)

Additional material: Papua New Guinea: Madang: 1♂: Baiteta, 17.vi.1996, O. Missa leg., *Trichadenia philippinensis* (Flacourtiaceae), light trap (FC n° 4141) (ISNB).

References: *Bromeliaemiris morobensis* Carvalho, 1981a: 55-56, as new species, DV, MG; Schuh 1995: 539, catalogue; Schuh 2002-2013, online catalogue.

Discussion: *Bromeliaemiris morobensis* Carvalho, 1981 was known by the male holotype (Carvalho 1981a: 56) from Morobe, north-west of Wau alone.

Hosts: In Baiteta Forest, *B. morobensis* was recorded only one time, by light trap, from *Trichadenia philippinensis* (Flacourtiaceae). The host plants of this species were unknown still (Schuh 2002-2013 online).

***Bryocorellisca* Carvalho, 1981a**

References: *Bryocorellisca* Carvalho, 1981a: 57, as new genus; Schuh 1995: 539, catalogue; Schuh 2002-2013, online catalogue.

Type species: *Bryocorellisca pallidoemboliata* Carvalho, 1981a, by original designation.

***Bryocorellisca pilosa* Carvalho, 1981a** (Plate 7 fig. 2)

Additional material: Papua New Guinea: Madang: 1♀ ISNB: Baiteta, 02.viii.1995, O. Missa leg., *Dysoxylum patigravianum* (Meliaceae), fogging (FC n° 5124); 1♀ ISNB: Baiteta, 03.viii.1995, O. Missa leg., *Artrocarpus incisus* (Moraceae), fogging (FC n° 5139); 1♂ ISNB: Baiteta, 03.v.1996, O. Missa leg., host unknown, fogging (FC n° 5123).

References: *Bryocorellisca pilosa* Carvalho, 1981a: 58-59, as new species; Schuh 1995: 539, catalogue; Schuh 2002-2013, online catalogue.

Discussion: *Bryocorellisca pilosa* Carvalho, 1981 was known by the female holotype from Bubia, Markham Valley, Morobe, Papua New Guinea alone.

Hosts: In Baiteta Forest, *B. pilosa* was recorded only by fogging, on two different hosts *Artrocarpus incisus* (Moraceae) and *Dysoxylum patigravianum* (Meliaceae). Hosts of species of the genus *Bryocorellisca* were apparently still unknown (Schuh 2002-2013 online).

***Carpinterocoris* gen. nov.**

Type species: *Carpinterocoris brailovskyi* gen. nov., sp. nov.

Derivatio nominis: The new genus is dedicated to our good colleague and friend Diego L. Carpintero (Buenos-Aires), for his important contribution to the study of the Neotropical Miridae fauna, for his contribution to the study of Anthocoridae on a world-scale and in remembrance of the happy days passed with the first author on the field in Argentina. Gender: masculine. *Carpinterocoris* is a genus-group name ending in a Greek word (*χόρις* i.e. bugs in Greek) translitered into latin "-coris" without any other change. According to Article 30.1.2 of the International Code of Zoological Nomenclature (ICZN 1999: 34-35), the name takes the gender given for the terminal word in standard Greek dictionaries.

Description: Relatively large and wide, elongate to slightly rounded, almost glabrous, shining eccritotarsine. Head wide, eyes substylate, large, not on a long peduncle, labium short, thick. Vertex not carinate, unsulcate. Pronotum wide, rugulose to shagreened, almost unpunctate, not narrowed basally, shining. Pronotal callosities large, medially fused. Pronotal collar very narrow, finely pilose. Tarsus three segmented, third segment dilated distally. Claws with setiform parempodia and large pulvilli, partially covering inner surface (Fig. 4). Hemelytra rugulose, almost unpunctate, glabrous, shining. Cuneus slightly longer than wide (ratio in females: 1.44 to 2.08, ratio in males: 1.46 to 1.75), inner margin almost straight.

Discussion: The tarsus three segmented, the third segment dilated distally, the claws with setiform parempodia (i.e. unmodified in fleshy, flattened pads, convergent or divergent apically) and with pulvilli arising at the base, large, covering a part of inner surface of claws (Fig. 4), the claws not cleft at midpoint, the habitus of both sexes (Plate 7 figs 3-6), the male genitalia and the membrane with two cells, the outer cell reduced, lead us to classify *Carpinterocoris* gen. nov. in the tribe Eccritotarsini of the subfamily Bryocorinae. *Carpinterocoris* can hardly be confused with other genera of Papuan eccritotarsine. When we use Carvalho's (1981a: 51-52) key of "Bryocorini"[2] sensu lato of Papua New Guinea, we are not able to accommodate our specimens in an already described genus. The absence of neck, the eyes substylate but not on a long peduncle and close to the anterior margin of

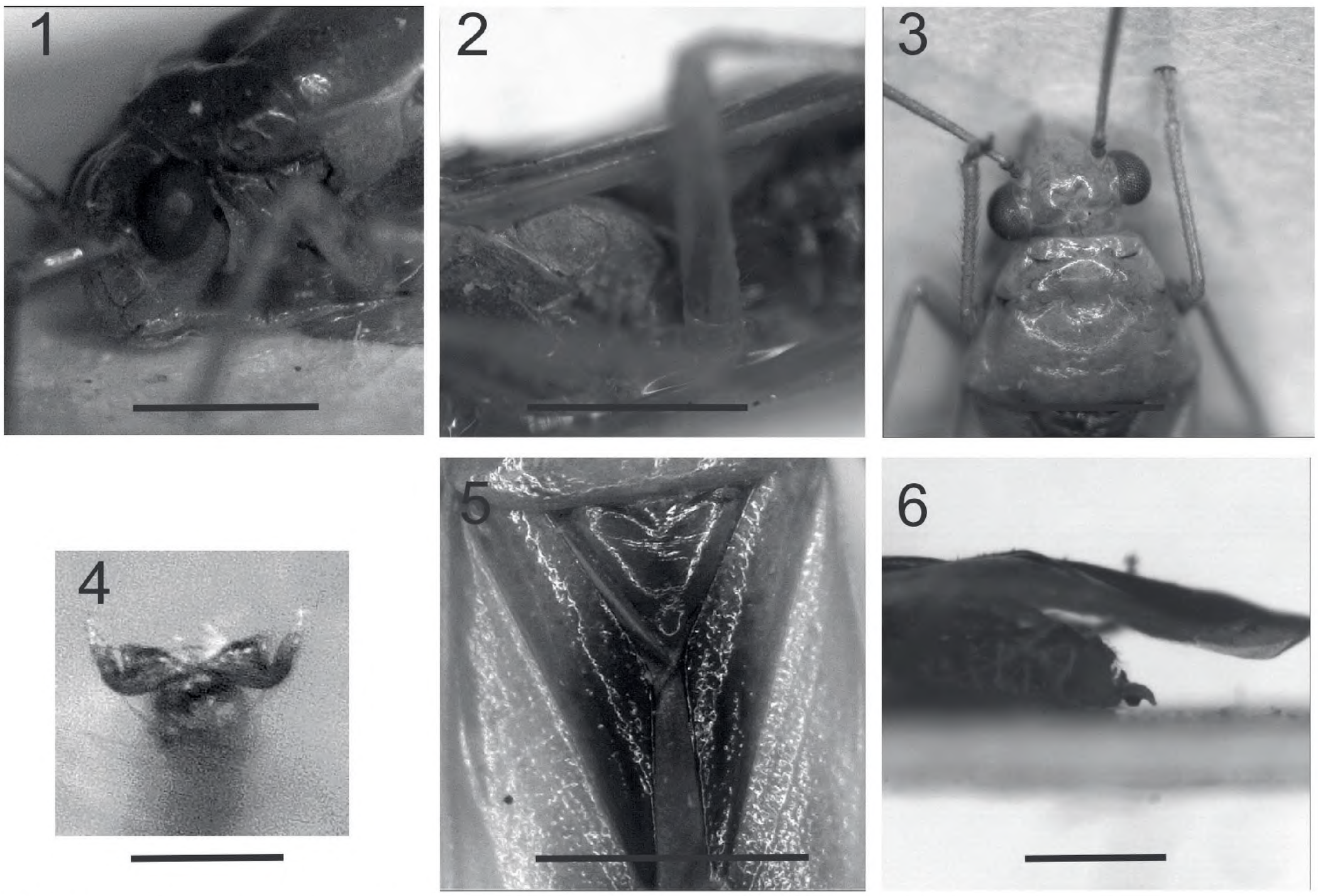
2 Including the tribes Bryocorini and Eccritotarsini as presently defined (Namyatova et al. 2015).











Figures 1-6. *Carpinterocoris brailovskyi* gen. nov., sp. nov. 1 – Head, lateral view (FC n° 5100); 2 – Thorax, lateral view (FC n° 5100); 3 – Head, dorsal view and pronotal surface (FC n° 5087); 4 – Pretarsus and claw; 5 – Left clavus (FC n° 5087); 6 – Pygophore (FC n° 5094) [scale bar 1 mm, except fig. 2 scale bar 0.5 mm and fig. 4 scale bar 0.1 mm].

the pronotum, the clear dorsal colouration, neither globally green, nor totally black, the relatively large size (4.5 to 5.5 mm), the hemelytra not narrowed submedially and the shape of the cunei, not particularly long, exclude almost all known genera. Alone, the genera *Ambunticoris* Carvalho, 1981a, *Fronsomiris* Carvalho, 1981a and *Palaeofurius* Poppius, 1912d seem relatively similar to *Carpinterocoris* gen. nov. However, the Papuan species of these three genera are smaller (2.8 to 3.5 mm), obviously pilose, and more strongly punctate on the pronotum. Their pronotum is also more strongly narrowed basally and their cunei longer, curved on the inner margin. The setae of antennal segments are longer in *Palaeofurius* Poppius, 1912d. From the other genera of eccritotarsine of Old-World, including some poorly known taxa such *Anthropophagiotes* Kirkaldy, 1908a from Fiji, *Grossicoris* Carvalho, 1973 from New Hebrides and New Caledonia, *Gunadhya* Distant, 1920 from New Caledonia, or *Rhopaliceschatus* Reuter, 1903 from Tibet, *Carpinterocoris* could be easily separated by the habitus, mainly the total size (shorter or longer), the shape of head and hemelytra, the colouration and the dorsal punctation. The habitus of *Dioclerus* Distant, 1910a, from Sri Lanka, northern India, Indochina and Malaysia (Stonedahl 1988b) is relatively similar to those of *Carpinterocoris* gen. nov. However, the vertex of *Carpinterocoris* is lacking strong posterior carina, the second antennal segment is shorter or slightly longer than the width of the head across eyes, the pronotal collar is narrow, the pronotal disk, the clavus and the corium are shagreened but almost unpunctate and the dorsal pilosity is almost absent. The male genitalia are relatively similar to those of several Eccritotarsini, notably *Eurycipitia clara* Distant, 1883 described by Kerzhner & Konstantinov (1999: 127, Fig. 27). Both taxa possess a phallus (aedeagus) subdivided in a tiny conjunctiva and a large endophallus (vesica), the latter being membranous and with outgrowths on its surface. Their ductus seminis is narrow, basally membranous, apically more sclerotised. Their secondary gonopore is reduced, hardly visible.

The relationships of the genera in the tribe Eccritotarsini are largely unresolved still, even if Stonedahl (1988b) suggested several groupings of



genera. Consequently, we are not able to identify the sister-taxon or even some close related taxa of *Carpinterocoris*.

***Carpinterocoris brailovskyi* sp. nov.** (Figs 1-12, Plate 7 figs 3-6)

Holotype ♂ ISNB: Papua New Guinea: Madang: "*Carpinterocoris brailovskyi* gen. nov., sp. nov. FC n° 5094. Det. F. Chérot, 2011" / "Holotype" / "Holotype *Carpinterocoris brailovskyi* Chérot, Gorczyca, Schwartz & Demol" / "Coll. I. R. Sc. N. B., Canopy Mission, Papua New Guinea (Madang Prov), Baiteta, 1995, Fogging AR14, Leg. O. Missa" [The code AR14 corresponds to *Chisocheton ceramicus* (Meliaceae)] (FC n° 5094).

Paratypes ISNB: 5♀, 1?: Baiteta, 14.vi.1995, O. Missa leg., *Chisocheton ceramicus* (Meliaceae), fogging (FC n°s 5084, 5093, 5096-5097, 5099-5100); 2♀: Baiteta, 20.vii.1995, O. Missa leg., *Celtis latifolia* (Ulmaceae), fogging (FC n°s 4142, 5087); 2♂, 6♀: Baiteta, 1995, O. Missa leg., *Chisocheton ceramicus* (Meliaceae), fogging (FC n°s 5083, 5086, 5088-5092, 5095); 1♀: Baiteta, 1995, O. Missa leg., *Celtis latifolia* (Ulmaceae) or *Planchonella* sp. (Sapotaceae), fogging (FC n° 5101); 1♀: Baiteta, 25.vii.1996, O. Missa leg., host unknown, fogging (FC n° 5085).

Derivatio nominis: The new species is named after our colleague Harry A. Brailovsky (Mexico) for his invaluable contribution on taxonomy and biology of Coreidae and Lygaeidae sensu lato on a world scale.

Description: Mid-sized relatively elongate eccritotarsine (Plate 7 fig. 3), total length of the females in dorsal view (n = 12): 4.75 to 5.59; total length of males in dorsal view (n = 2): 4.51 to 4.66; maximal width of females near the middle of hemelytra (n = 13): 1.57 to 1.86; maximal width of males near the middle of hemelytra (n = 3): 1.42 to 1.52. Head. Clypeus free, not covered by frons in dorsal view, yellowish to brownish, almost glabrous or with short white setae. Maxillary and mandibular plates small, uncarinate, lacking a tubercle, yellowish (Fig. 1). Frons slightly rounded, not striate, yellowish, brownish or greenish, almost glabrous (Fig. 1). Eyes substylate, large, glabrous, red-brown, occupying majority of head height in lateral view. Total width of diatone in females (n = 15): 1.02 to 1.19, total width of diatone in males (n = 2): 1.05 to 1.09; width of vertex in females (n = 15): 0.55 to 0.67, width of vertex in males (n = 2): 0.52 to 0.58. Vertex not carinate, unsulcate, smooth, yellowish to greenish sometimes with a fuzzy brown patch in middle. Antenna relatively short. First and second segments relatively thick, yellowish to orange-brown, first slightly curved, widened subbasally and apically, slightly narrowed medially, second slightly club-like. Third and fourth narrower and darker, grey. Pilosity of joints white, sub-erect, stiff, slightly longer than width of second segment. Lengths of the joints of females: I: 0.38 to 0.51 (n = 15), II: 1.53 to 1.82 (n = 15), III: 0.43 to 0.53 (n = 10) and IV: 0.45 to 0.57 (n = 8). Lengths of the joints of males: I: 0.43 to 0.49 (n = 3), II: 1.26 to 1.42 (n = 3), III: 0.38 to 0.43 (n = 3) and IV: 0.43 to 0.51 (n = 3). No neck: posterior margin of eyes close to anterior margin of pronotum. Labium thick, short, yellow to orange brown, its apex darker. Thorax. Pronotum (Fig. 3). Total length (collar included) in females: 0.85 to 1.26 (n = 15), total length in males (collar included): 0.89 to 1.23 (n = 3); posterior width in females: 1.48 to 1.98 (n = 15), posterior width in males: 1.42 to 1.84 (n = 3). Collar very narrow (medial length: 0.02 to 0.04), yellowish, with a very short, suberect pilosity. Pronotal callosities yellowish, large and wide, medially fused (Fig. 3). Pronotal disk almost glabrous, shining, rugulose, yellowish to brownish or greenish, with a very shallow and relatively narrow punctation. Lateral margins of disk with narrow yellow carinae posteriorily. Mesoscutum totally covered (Fig. 5). Scutellum almost glabrous, shagreened, relatively flat, unicolourous brown (Fig. 5). Length in females: 0.63 to 0.85 (n = 15), length in males: 0.59 to 0.71 (n = 3); basal width in females: 0.51 to 0.77 (n = 15), basal width in males: 0.51 to 0.53 (n = 3). Legs. Yellow. Metafemora with several long clear brown setae, black spinulae and yellowish spines. Segments of tarsi yellow-brown, claws orange-brown, typical of eccritotarsine (Fig. 4). Hemelytra dull to slightly shiny, shagreened, almost unpunctate, the punctation very shallow, narrow (Fig. 5). Pilosity sparse, the setae short, adpressed, white. Clavus opaque, yellowish to greenish basally, dark brown apically. Endocorium opaque, yellowish to greenish, sometimes with a large brown patch close to inner margin (Plate 7 fig. 4). Exocorium slightly rounded, yellowish. Outer margins of exocorium brown. Cuneus yellow to brown. Length of the cuneus in females: 0.64 to 0.84 (n = 15), length of the cuneus in males: 0.62 to 0.67 (n = 3); width of the cuneus in females: 0.36 to 0.52 (n = 15), width of the cuneus in males: 0.24 to 0.43 (n = 3). Membrane brown, veins brown. Abdomen greenish to grey-brown, with long white setae (Fig. 6).

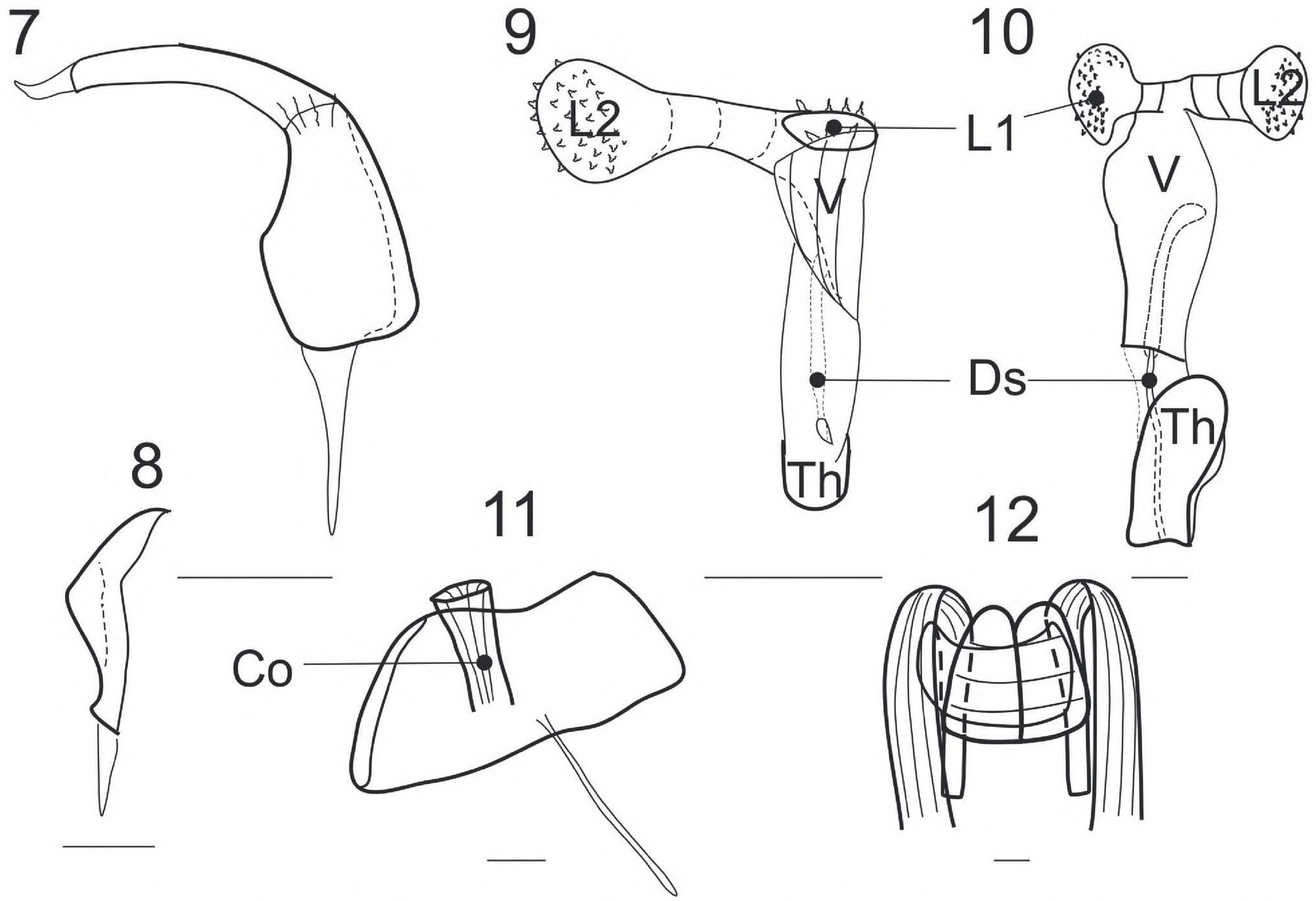
Male genitalia: Left paramere (Fig. 7) sickle-like, arm elongate, primary apophysis hooked. Right paramere (Fig. 8) small. Phallus (aedeagus sensu Kerzhner & Konstantinov, 1999) complex (Figs 9-10). Theca (Th) sclerotised. *Ductus seminis*











Figures 7-12. *Carpinterocoris brailovskyi* gen. nov., sp. nov., genitalia of ♂ paratype FC n° 5083 and ♀ paratype FC n° 5089. 7 – Left parameres, dorsal view; 8 – Right parameres, dorsal view; 9-10 – Endophallus, different views; 11 – Dorsal wall in dorsal view; 12 – Posterior wall [scale bar 0.1 mm, except fig. 8 scale bar 0.05 mm].

(Ds) narrow, basally membranous, apically more sclerotised. Secondary gonopore and conjunctiva hardly visible. Endophallus, endosoma or vesica (V) large, with two apical membranous lobes (L1, L2).

Female genitalia: Parieto-vaginal rings hardly visible. Dorsal wall (Fig. 11) membranous, common oviduct (Co) wide. Posterior wall (Fig. 12) membranous.

Sexual dimorphism: The males are similar but apparently smaller than the females, with wider eyes.

Discussion: *Carpinterocoris brailovskyi* gen. nov., sp. nov. can be recognized by its habitus and by the genitalia of both sexes.

Hosts: *Carpinterocoris brailovskyi* gen. nov., sp. nov. was collected by fogging, in five independent collection events, on two different host plants: *Chisocheton ceramicus* (Meliaceae) and *Celtis latifolia* (Ulmaceae).

Harpedona Distant, 1904

References: *Harpedona* Distant, 1904c: 418, as new genus; Carvalho 1981a: 68-72 (species from Papua New Guinea); Stonedahl 1988b: 16-32 (revision); Schuh 1995: 552-554, catalogue; Schuh 2002-2013, online catalogue.

Type species: *Harpedona marginata* Distant, 1904c, by original designation.

***Harpedona gressitti* Stonedahl, 1988b** (Plate 7 fig. 7)

Additional material ISNB: Papua New Guinea: Madang: 1♂: Baiteta, 09.vi.1995, O. Missa leg., *Sarcocephalus* sp. (Rubiaceae), fogging (FC n° 5126).

References: *Harpedona gressitti* Stonedahl, 1988b: 23-24, as new species; Schuh 1995: 552-554, catalogue; Schuh 2002-2013, online catalogue.

Discussion: *Harpedona gressitti* Stonedahl, 1988b was known by the male holotype (Stonedahl 1988b: 24) from Tsenga, Upper Jimmi Valley, Western Highlands, Papua New Guinea alone.

Hosts: In Baiteta Forest, *H. gressitti* was recorded only by fogging, on *Sarcocephalus* sp. (Rubiaceae). Hosts of this species were apparently unknown still (Schuh 2002-2013 online). *Harpedona marginata* Distant, 1904c, also known from Papua New Guinea, is recognized as a pest of *Dioscorea* sp. (Stondahl 1988b: 26).



***Nabirecoris* Carvalho, 1981a**

References: *Nabirecoris* Carvalho, 1981a: 78, as new genus; Schuh 1995: 558, catalogue; Schuh 2002-2013, online catalogue.

Type species: *Nabirecoris minutus* Carvalho, 1981a, by original designation.

***Nabirecoris minutus* Carvalho, 1981a** (Plate 7 fig. 8)

Additional material 1♀(?) ISNB: Papua New Guinea: Madang: Baiteta, 01.v.1996, O. Missa leg., host unknown, fogging (FC n° 5127).

References: *Nabirecoris minutus* Carvalho, 1981a: 78, as new species; Schuh 1995: 558, catalogue.

Discussion: *Nabirecoris minutus* Carvalho, 1981 was known by the female holotype alone from north-west of Nabire, south of Geelvink Bay (presently Cenderawashi Bay), Papua Barat, Indonesia (Carvalho 1981a: 78). Its host plant is unknown.

***Prodromus* Distant, 1904c**

References: *Prodromus* Distant, 1904c: 436-437, as new genus; Stonedahl 1988b: 53-88 (revision); Schuh 1995: 568-570, catalogue; Schuh 2002-2013, online catalogue.

Type species: *Prodromus subflavus* Distant, 1904c, by original designation.

= *Prodromopsis* Poppius, 1911b: 4, as new genus; Carvalho 1981a: 80-83 (species from Papua New Guinea); Stonedahl 1988b: 53 (reference for synonymy).

Type species: *Prodromus cuneatus* Distant, 1909a, by original designation, a junior synonym of *Prodromus clypeatus* Distant, 1904c.

***Prodromus oculatus* (Poppius, 1912e)** (Plate 7 fig. 9)

Additional material 1♀ ISNB: Papua New Guinea: Madang: Baiteta, 05.vi.1996, O. Missa leg., *Celtis philippinensis* (Ulmaceae), light trap (FC n° 5125).

References: *Prodromopsis oculatus* Poppius, 1912e: 10, as new species; Carvalho 1981a: 81-82, redescription; *Prodromus oculatus*: Stonedahl 1988b: 79-81, redescription; Schuh 1995: 569, catalogue; Schuh 2002-2013, online catalogue.

Discussion: *Prodromus oculatus* Poppius, 1912e is known from Indonesia (Irian Jaya) and from Papua New Guinea, countries where it is widely distributed.

Hosts: In Baiteta Forest, *P. oculatus* was recorded only one time, by light trap, on *Celtis philippinensis* (Ulmaceae). The species is frequently found on banana trees, *Musa* spp. (Musaceae), and occurs regularly in light trap catches (Stonedahl 1988b: 80).

Cylapinae Kirkaldy, 1903
Bothriomirini Kirkaldy, 1906

***Bakeriola* Bergroth, 1920**

References: *Bakeriella* Poppius, 1915b: 46, as new genus; *Bakeriola* Bergroth, 1920: 70 (nom. nov. for *Bakeriella* Poppius, 1915b, preoccupied by *Bakeriella* Kieffer, 1910, Hymenoptera, Bethylidae); Schuh 1995: 19, catalogue; Gorczyca 2006a: 9, catalogue; Wolski & Gorczyca 2012: 7, key of Oriental Bothriomirini; Schuh 2002-2013, online catalogue.

Type species: *Bakeriella crassicornis* Poppius, 1915b, by original designation.

***Bakeriola* sp.** (Plate 8 fig. 1)

Additional material 1♂ ISNB: Papua New Guinea: Madang: Baiteta, 27.vi.1995, O. Missa leg., host unknown, fogging (FC n° 5121).

Discussion: The unique specimen available from Baiteta Forest obviously belongs to the small tribe Bothriomirini of the subfamily Cylapinae by the claws and hemelytra structures. The sole correctly preserved claw is elongate, lacking parempodia (= arolia), pulvilli (= pseudarolia) and basal tooth (but with a small subapical tooth). The hemelytra are strongly punctate, the membrane being pilose. Assigning it to a genus is more difficult. After analysis of the available literature about the Bothriomirini genera (Carvalho 1955; Gorczyca 2000; Gorczyca & Wolski 2006; Wolski & Gorczyca 2006; 2012; Yasunaga 2000), we can exclude *Afrobothriomiris* Gorczyca, 2000, *Dashymeniella* Poppius, 1914c or *Leprocapsus* Poppius, 1914c, as the habitus of our specimen is totally different, and *Bothriomiris* Kirkaldy, 1902a, as the first antennal segment is shorter than the vertex width. We classify our specimen with doubt in *Bakeriola* Bergroth, 1920. At present, the genus *Bakeriola* Bergroth, 1920 is monospecific, including only the type species *Bakeriola crassicornis* (Poppius, 1915b) from the Mt Makiling, Luzon, Philippines Islands, known by the holotype female alone. It is possible our specimen belongs to a new species of this genus, however it seems premature to describe it. Additional specimens of both sexes of *Bakeriola* from Papua New Guinea should be obtained before eventual description.






Hosts: unknown.

***Bothriomiris* Kirkaldy, 1902a**

References: *Bothriomiris* Kirkaldy, 1902a: 270, as new genus; Schuh 1995: 20, catalogue; Gorczyca 2006a: 9-11, catalogue; Wolski & Gorczyca 2012: 8-16, revision of Oriental species; Schuh 2002-2013, online catalogue.

Type species by monotypy: *Bothriomiris marmoratus* Kirkaldy, 1902a, a junior synonym of *Capsus dissimulans* Walker, 1873b.

***Bothriomiris* sp.** (Plate 8 fig. 2)

Additional material 1♀ ISNB: Papua New Guinea: Madang: Baiteta, 10.vii.1996, O. Missa leg., host unknown, fogging (FC n° 4162).

Discussion: by its habitus, our specimen belongs to the genus *Bothriomiris*. Unfortunately, specific identification of the female specimen of this genus remains difficult, the genitalia being described only in one Japanese species: *B. gotohi* Yasunaga, 2000. The genitalia of our specimen are very different from those of *B. gotohi* and we can consequently rule out membership to this species.

According to Carvalho & Lorenzato (1978), only one species of the genus *Bothriomiris* exists in Papua New Guinea: *B. lugubris* Poppius, 1915b, described from Taiwan. However, the identity of the Papuan species analysed by Carvalho & Lorenzato (op. cit.) is now challenged: it could be an undescribed species, not the true *B. lugubris* (Yasunaga 2000; Gorczyca 2006a; Wolski & Gorczyca 2012). Resolving this problem and accurately assigning our specimen will require additional specimens of both sexes from Papua New Guinea.

Hosts: unknown.

Fulviini Uhler, 1886

***Bironiella* Poppius, 1909**

References: *Bironiella* Poppius, 1909: 23, as new genus; Carvalho & Lorenzato 1978: 129 (redescription); Schuh 1995: 19-20, catalogue; Gorczyca 2006a: 25-26, catalogue; Schuh 2002-2013, online catalogue.

Type species: *Bironiella metallescens* Poppius, 1909, by original designation.

***Bironiella metallescens* Poppius, 1909** (Plate 8 fig. 3)

Additional material: 1♂ & 1♀ ISNB: Papua New Guinea: Madang: Baiteta, 30.vi.1995, O. Missa leg., *Ficus* sp. (Moraceae), fogging (FC n°s 5073, 5075); 1♂ ISNB: Papua New Guinea: Madang: Sisimangum village, 01.viii.1981, Van Goethem J. leg. (FC n°5075a).

References: *Bironiella metallescens* Poppius, 1909: 23, as new species; Carvalho & Lorenzato 1978: 130-131 (redescription, DV, MG); Schuh 1995: 20, catalogue; Gorczyca 2006a: 25-26, catalogue; Schuh 2002-2013, online catalogue.

Discussion: *Bironiella metallescens* Poppius, 1909 was described on the basis of the male holotype from Sattelberg, Huon Golf, Papua New Guinea alone. Additional specimens were later cited in the literature, from Papua New Guinea and Indonesia (Carvalho & Lorenzato 1978; Gorczyca 2006a). Few data on biology are available for this species: it was found on logs of *Castanopsis accuminatissima* and was collected in light traps (Gorczyca 2006a).

Hosts: In Baiteta Forest, *B. metallescens* was recorded only in one collection event, by fogging, from *Ficus* sp. (Moraceae).

***Bironiella rubernotata* Carvalho, Lorenzato, 1978**

Additional material 1♂ ISNB: Papua New Guinea: Madang: Baiteta, 23.vii.1996, O. Missa leg., *Litsea irianensis* (Lauraceae), fogging (FC n° 5074).

References: *Bironiella ruberonotata* Carvalho, Lorenzato, 1978: 130-131, as new species, DV, MG; Schuh 1995: 20, catalogue; Gorczyca 2006a: 26, catalogue; Schuh 2002-2013, online catalogue.

Discussion: The parameres are "typical" of the genus *Bironiella* Poppius, 1909, the spiculum is as in *B. trinotata* Carvalho, Lorenzato, 1978, but its apical part is laterally hooked.

Bironiella ruberonotata Carvalho & Lorenzato, 1978 was described on the female holotype from "Boden, 11 km SE of Oereberfaren" (= Bodem, Oberfaren), Papua Barat, Indonesia alone, a specimen collected by light trap.

Hosts: In Baiteta Forest, *B. ruberonotata* was recorded only one time, by fogging, from *Litsea irianensis* (Lauraceae).

***Cylapofulvius* Poppius, 1909**

References: *Cylapofulvius* Poppius, 1909: 20-21, as new genus; Carvalho & Lorenzato 1978: 129, 133-135, key of Fulvinii genera and species from Papua New Guinea; Schuh 1995: 22, catalogue; Chérot & Gorczyca 2000: 217, revision; Gorczyca 2006a: 32-50, catalogue; Schuh 2002-2013, online catalogue.

Type species: *Cylapofulvius punctatus* Poppius, 1909, by original designation.






***Cylapofulvius punctatus* Poppius, 1909** (Plate 8 fig. 4)

Lectotype ♂ HNHM, designation by Carvalho & Lorenzato, 1978: 135: Papua New Guinea: Madang: "Stephansort, Astrolabe Bai, 1897, Biro" (= Biró) (FC n° 5050).

Additional material 1♂ US: Papua New Guinea: Madang: Baiteta, 1994, O. Missa leg., host unknown (without number).

References: *Cylapofulvius punctatus* Poppius, 1909: 20-21, as new species; Carvalho & Lorenzato 1978: 134-135 (redescription); Schuh 1995: 22, catalogue; Chérot & Gorczyca 2000: 217, revision; Gorczyca 2006a: 32-50, catalogue; Schuh 2002-2013, online catalogue.

Discussion: *Cylapofulvius punctatus* Poppius, 1909 was described using several specimens of both sexes from Astrolabe Bay, Madang Province, Papua New Guinea. Additional specimens were cited from several places in Papua New Guinea's Central Province (Poppius 1909: 23, syntypes of *C. griscens* Poppius, 1909, a junior synonym of *C. punctatus*), Morobe Province, Northern Province (Carvalho & Lorenzato 1978: 135; Chérot & Gorczyca 2000: 219), New Ireland and New Britain but also from Indonesia, Papua Barat (Carvalho & Lorenzato 1978: 135) and from the Solomon Islands (Chérot & Gorczyca 2000: 219).

Hosts: The biology of this species is virtually unknown. A specimen from Papua New Guinea, Bulolo Mankila was recorded on a log of *Gastonia* sp. (Araliaceae) according to Chérot & Gorczyca (2000: 219).

***Fulvius* Stål, 1862**

References: *Fulvius* Stål, 1862: 322, as new genus; Carvalho & Lorenzato 1978: 129, 135-142, key of Fulvinii genera and species from Papua New Guinea; Schuh 1995: 25-29, catalogue; Gorczyca 2002: 9-23, species from Oriental Region and New Guinea; Gorczyca 2006a: 32-50, catalogue; Sadowska-Woda et al. 2006: 617-636, female genitalia of several species; Schuh 2002-2013, online catalogue.

Type species: *Fulvius anthocorides* Stål, 1862, by monotypy.

***Fulvius constanti* Gorczyca, 2004** (Plate 8 fig. 5)

= *Fulvius nigricornis* sensu Carvalho & Lorenzato, 1978 nec Poppius, 1909: 136 ("redescription").

Holotype ♂ ISNB: Papua New Guinea: Madang: "*Fulvius constanti* sp. nov. Gorczyca, 2004" / "Coll. I. R. Sc. N. B., Canopy Mission Papua New Guinea, Madang prov., Baiteta, 08.vi.1993, light trap M1, Leg. *Olivier Missa*" [the code number M1 corresponds apparently to *Dracontomelum dao*, Anacardiaceae].

Paratypes 6 specimens ISNB: 1♂ & 1♀: data as in holotype; 1♂: *idem*, 13.iv.1996, O. Missa leg., on *Celtis philippinensis* (Ulmaceae), light trap; 1♀: *idem*, 03.vi.1996, O. Missa leg., light trap; 1♂: *idem*, 19.vi.1996, O. Missa leg., on *Ficus* sp.(Moraceae), light trap; 1♂: *idem*, 02.vii.1996, O. Missa leg., on ?, light trap.

Additional material 1♀ ISNB: Papua New Guinea: Madang: Baiteta, 18.vi.1996, O. Missa leg., on *Trichadenia philippinensis* (Flacourtiaceae), light trap (FC n° 4175).

References: *Fulvius constanti* Gorczyca, 2004: 153-156, as new species; Gorczyca 2006a: 41, catalogue; Sadowska-Woda et al. 2006: 625-626, female genitalia; Schuh 2002-2013, online catalogue.

Discussion: *Fulvius constanti* Gorczyca, 2004 was described from Baiteta Forest on seven specimens of both sexes. Additional specimens were cited from New Britain and also from Papua Barat, Indonesia (Cyclops Mountains and Yos Sudarso Bay, formerly Humboldt Bay) by Gorczyca (2006a).

Hosts: In Baiteta Forest, *F. constanti* was recorded six times, only by light trap, from different hosts: *Celtis philippinensis* (Ulmaceae), *Dracontomelum dao* (Anacardiaceae), *Ficus* sp. (Moraceae) and *Trichadenia philippinensis* (Flacourtiaceae). Therefore, the eight known specimens of Baiteta were recorded in six different collection events on four different host plants (belonging to four different families). However, this result may not be significant. First, all specimens were attracted by light (as it is frequent in *Fulvius*) and then their origin is uncertain. Second, several *Fulvius* spp. have apparently unspecialised predaceous habits (Pluot Sigwalt & Chérot 2013). This may be the case for *F. constanti* which could explain our results. Some other Cylapinae could include both fungi and small invertebrates in their diet (Wheeler 2001).

***Fulvius nigricornis* Poppius, 1909** (Plate 8 fig. 6)

Additional material 1♀ ISNB: Papua New Guinea: Madang: Baiteta, 03.viii.1995, O. Missa leg., on *Artrocarpus* sp. (Moraceae), fogging (FC n° 4176).

References: *Fulvius nigricornis* Poppius, 1909: 30, 37, 44, as new species; Schuh 1995: 28, catalogue; Gorczyca 2006a: 36, catalogue; Schuh 2002-2013, online catalogue.

Discussion: *Fulvius nigricornis* Poppius, 1909 was described from Si-Oban, Mentawai Island,









Indonesia on several specimens. The species is also cited from Sumatra and from Malaysia (Gorczyca 2006a). It would be a predator of weevils' eggs (Wheeler 2001, table 14.1, p. 284).
Hosts: In Baiteta Forest, *F. nigricornis* was recorded only once, by fogging, from *Artrocarpus* sp. (Moraceae).

***Fulvius pallidus* Poppius, 1909** (Plate 8 fig. 7)
Additional material ISNB: Papua New Guinea: Madang: 1♀ (?): Baiteta, 03.vi.1996, O. Missa leg., on *Celtis philippinensis* (Ulmaceae), light trap (FC n° 4167); 1♂: *idem*, on *Dracontomelum dao* (Anacardiaceae), light trap (FC n° 4168).

References: *Fulvius pallidus* Poppius, 1909: 29, 32, 44, as new species; Carvalho & Lorenzato 1978: 138, redescription; Schuh 1995: 28, catalogue; Gorczyca 2006a: 37, catalogue; Schuh 2002-2013, online catalogue.
Discussion: *Fulvius pallidus* Poppius, 1909 was described from Simbang, Huon Golf, Papua New Guinea, on some specimens of both sexes. The species is widely distributed, from Malaysia to Micronesia (Gorczyca 2006a).
Hosts: In Baiteta Forest, *F. nigricornis* was recorded only twice, by light trap, from *Celtis philippinensis* (Ulmaceae) and *Dracontomelum dao* (Anacardiaceae).

***Fulvius stysi* Chérot, Gorczyca, 2008** (Plate 8 fig. 8)
Holotype ♂ ISNB: Papua New Guinea: Madang: "*Fulvius stysi* sp. nov. Chérot & Gorczyca, 2008" / "Coll. I. R. Sc. N. B., Canopy Mission Papua New Guinea, Madang prov., Baiteta, 1995, Fogging, AR14, Leg. Olivier Missa" [the code number AR14 corresponds to a fogging on *Chisocheton ceramicus*, Meliaceae].
Paratypes 2 specimens ISNB: 1♀: "Paratype *Fulvius stysi* sp. nov. Chérot & Gorczyca, 2008" / "Coll. I. R. Sc. N. B., Canopy Mission Papua New Guinea (Madang prov.), Baiteta, Fog (ging) AR51, 15.vi.1996, leg. Olivier Missa"; 1♀: "Paratype Fulvius stysi sp. nov. Chérot & Gorczyca, 2008"/ "Coll. I. R. Sc. N. B., Canopy Mission, Papua New Guinea, Madang prov., Baiteta, Fog(ging), AR67, 18.vi.1996, Leg. *Olivier Missa*" [the code numbers AR51 and 67 correspond to a fogging on unknown plants].

References: *Fulvius stysi* Chérot, Gorczyca, 2008: 371-374, as new species; Schuh 2002-2013, online catalogue.
Discussion: *Fulvius stysi* Chérot, Gorczyca, 2008 was described from Baiteta Forest on three specimens of both sexes. All specimens were recorded by fogging, on *Chisocheton ceramicus* (Meliaceae) and two unknown host plants.

***Fulvius subnitens* Poppius, 1909** (Plate 8 fig. 9)
Additional material: Papua New Guinea: Madang: 2♂ & 1♀ ISNB: Baiteta, 03.vi.1996, O. Missa leg., on *Dracontomelum dao* (Anacardiaceae), light trap (without number); 1♀ US: Baiteta, 03.vi.1996, O. Missa leg., light trap, host unknown (without number); 1♂ ISNB: Baiteta, 18.vi.1996, O. Missa leg., on *Trichadenia philippinensis* (Flacourtiaceae), light trap (without number) (Gorczyca 2006); 1♂(?) & 1♀ ISNB: Baiteta, 19.vi.1996, O. Missa leg., on *Celtis philippinensis* (Ulmaceae), light trap (FC n° 4165, 4167b); 1♂ ISNB: *idem*, on *Ficus* sp. (Moraceae), light trap (FC n° 4166); 1♂ ISNB: Baiteta, 04.vii.1996, O. Missa leg., fogging, on *Sloanea sogeriensis* (Eleocarpaceae) (without number) (Gorczyca 2006a).

References: *Fulvius subnitens* Poppius, 1909: 30, 34, 44, as new species; Carvalho & Lorenzato 1978: 139, redescription; Schuh 1995: 29, catalogue; Gorczyca 2000: 83-84, redescription; 2006a: 41-42, catalogue; Schuh 2002-2013, online catalogue.
Discussion: *Fulvius subnitens* Poppius, 1909 was described from Papua New Guinea, Bujakori, apparently in Central Province (Carvalho & Lorenzato 1978), from other places in Papua New Guinea (Paumomu River, Moroka, also in Central Province; Astrolabe Bay, Madang Province), from Indonesia (Mentawai Archipelago, Sipora Island; Ighibirei, Papua Barat) and probably from Philippines Islands (Engano, Malakonni, maybe Engano Cape on Palaui Island). It is widely distributed, from Africa (Tanzania, Togo) and the Seychelles to Taiwan and the Pacific Islands and from Malaysia to Papua New Guinea (Carvalho & Lorenzato 1978; Gorczyca 2006a).
Hosts: In Baiteta Forest, *F. subnitens* was recorded mainly by light trap, from *Celtis philippinensis* (Ulmaceae), *Dracontomelum dao* (Anacardiaceae), *Ficus* sp. (Moraceae), *Sloanea sogeriensis* (Eleocarpaceae) and *Trichadenia philippinensis* (Flacourtiaceae). In Malaysia, the species was also recorded on *Hevea* (Gorczyca 2006a).

***Fulvius variegatus* Poppius, 1909** (Plate 8 fig. 10)
Additional material ISNB: Papua New Guinea: Madang: 1♀: Baiteta, 09.iv.1996, O. Missa leg., on *Terminalia sepikana* (Combretaceae), light trap (FC n° 4163); 1♀ (?): *idem*, on *Pometia pinnata* (Sapindaceae), light trap (FC n° 4164); 1♀: *idem*, 15.iv.1996, *Terminalia sepikana* or *Piteleocarpus indicum* (Combretaceae and Fabaceae respectively), light trap (FC n°4162).

References: *Fulvius variegatus* Poppius, 1909: 31, 38, 44, as new species; Carvalho & Lorenzato 1978: 142, redescription; Schuh 1995: 29,







catalogue; Gorczyca 2006a: 39-40, catalogue; Schuh 2002-2013, online catalogue.
Discussion: *Fulvius variegatus* Poppius, 1909 was described from Ighibirei, Central Province, Papua New Guinea (Carvalho & Lorenzato 1978) and from other places in Papua New Guinea. It is widely distributed in Pacific area (Gorczyca 2006a).
Hosts: In Baiteta Forest, *F. variegatus* was recorded by light trap, from *Pometia pinnata* (Sapindaceae), and *Terminalia sepikana* (Combretaceae). It would be a predator of weevils' eggs, at least in Hawaii (Wheeler 2001, table 14.1, p. 284), and is sometimes found on banana trash, sugar cane, fallen fruits, dead leaves and inside rotten logs.

***Peritopis* Uhler, 1891**
References: *Peritopis* Uhler, 1891: 121, as new genus; Carvalho & Lorenzato 1978: 129, 143-145, key of Fulvinii genera, species from Papua New Guinea; Schuh 1995: 33-34, catalogue; Gorczyca & Chłond 2005: 167, description of a new species from Papua New Guinea; Gorczyca 2006a: 54-66, catalogue; 2006b: 401-422, revision of species of Oriental Region, key; Schuh 2002-2013, online catalogue.
Type species: *Peritropis saldaeformis* Uhler, 1891, by monotypy.

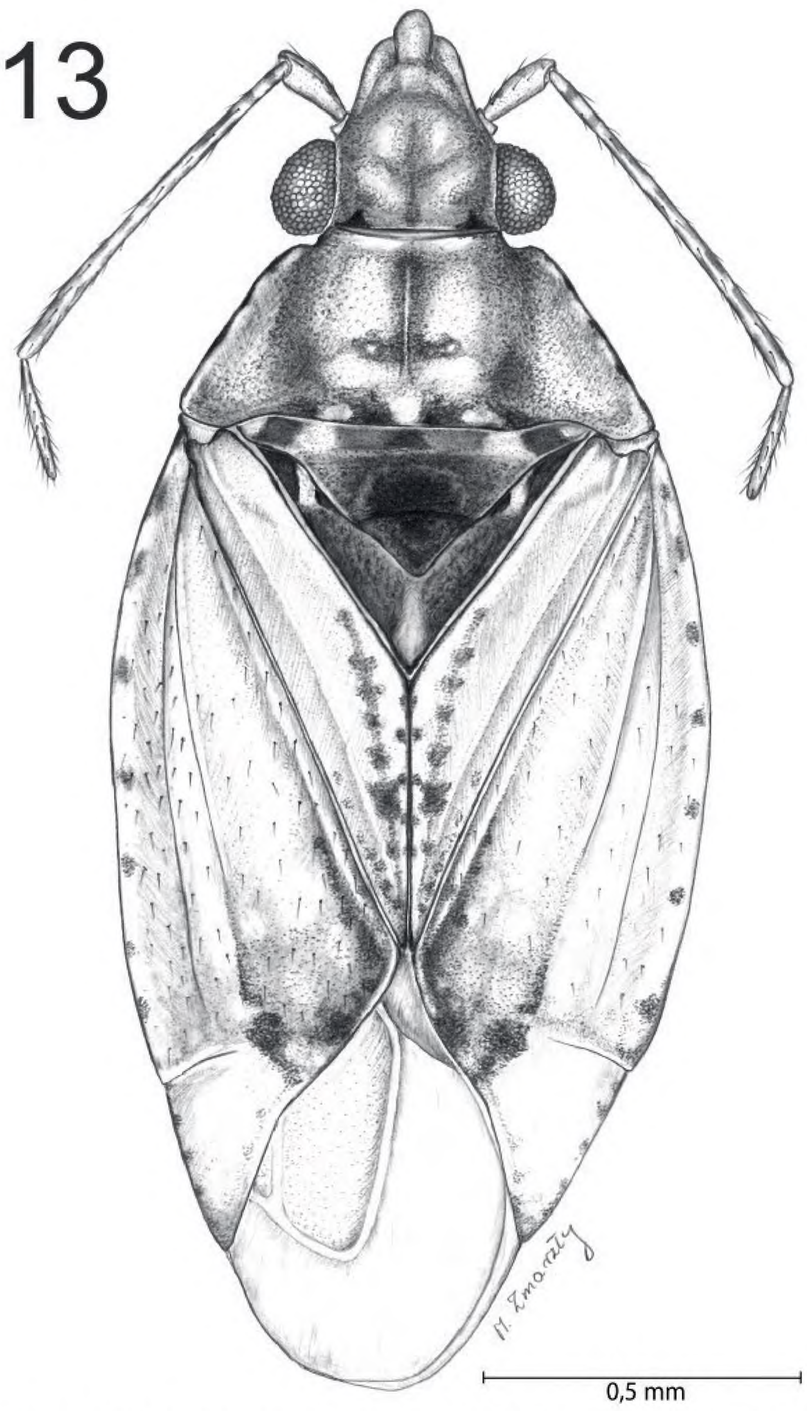
***Peritropis graziae* sp. nov.** (Figs 13-22)
Holotype ♀ ISNB: Papua New Guinea: Madang: "*Peritropis graziae* sp. nov. FC n° 4178. Det. J. Gorczyca, 2010" / "Holotype" / "Holotype *Peritropis graziae* Chérot, Gorczyca, Schwartz & Demol" / "Coll. I. R. Sc. N. B., Canopy Mission, Papua New Guinea (Madang Prov), Baiteta, 13.vii.1995, Fogging AR20, Leg. O. Missa" [The code AR20 corresponds to *Ficus polyantha* (Moraceae)] (FC n° 4178).

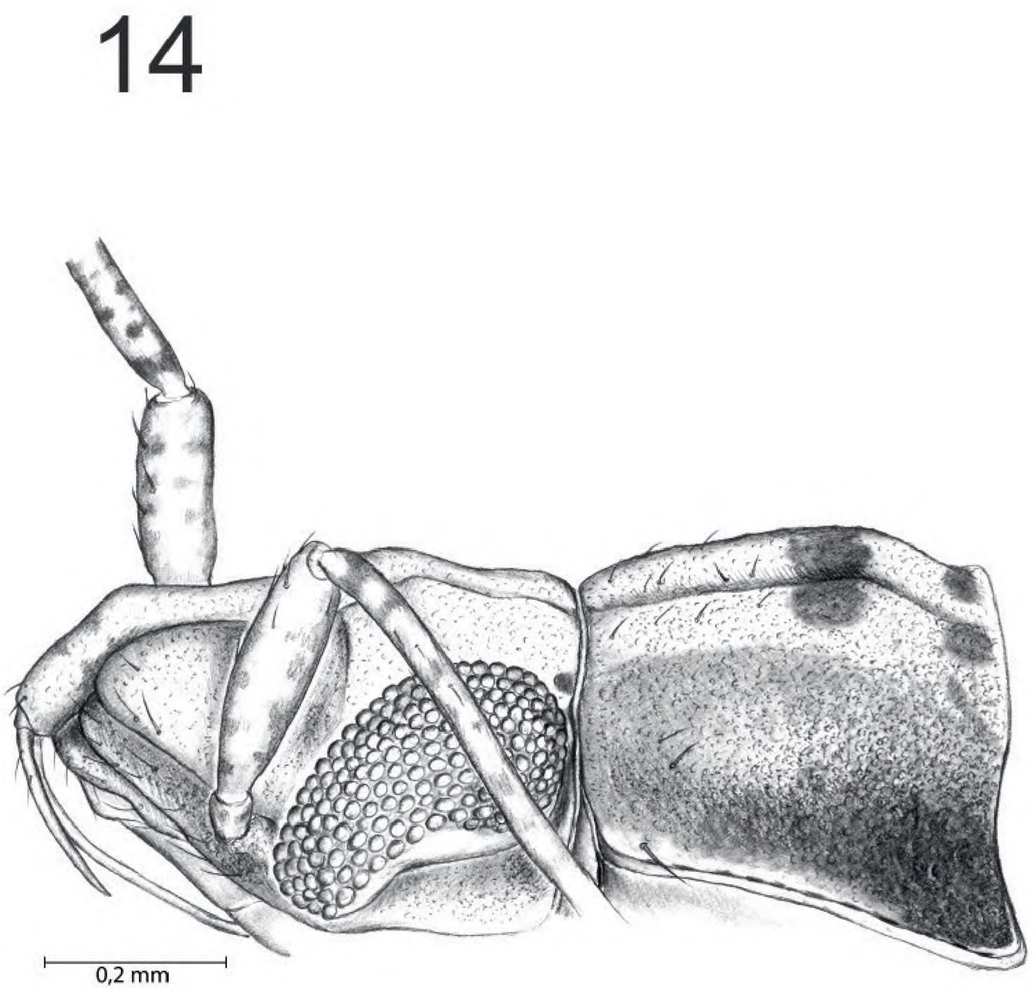
Derivatio nominis: The new species is dedicated to our colleague Prof. J. Grazia (Universidade Federal do Rio Grande do Sul, Porto Alegre), first president of the International Heteropterists Society (HIS), for her invaluable contribution on taxonomy of Pentatomidae on a world scale.
Description: Female. Body oval (Fig. 13) pale, covered with fine, short, pale, scale-like setae. Length of body 2.45, width 1.10. Head (Figs 13, 14) white, with small orange spots on clypeus and slightly tinged with orange. Length of head (in dorsal view), 0.40, width 0.52, diameter of eye 0.10. Antennae covered with very short setae. First antennal segment slightly thickened, white with small pale orange patches, second segment almost cylindrical, pale with brown pattern, pale brown in apical part. Third segment very short, pale, covered with pale, shining setae (fourth segment broken in the specimen examined). Length of antennal segments: 0.24, 0.70, 0.22. Labium not well visible in examined specimen. Thorax. Pronotum (Fig. 18) pale in middle with four brown patches, darkened on sides, anterior lobe convex with short longitudinal incision in middle. Lateral margins of pronotum distinctly elevated, posterior margin with small incision. Length of pronotum 0.35, length of anterior margin 0.52, length of lateral margins 0.38, length of posterior margin 0.88. Mesoscutum dark brown almost black, shining, with small pale patches on sides. Scutellum dark brown almost black, shining. Legs. Coxae and trochanters white, femora white with a few small spots in apical part. Tibiae pale with brown rings and patches, tarsi very short, two-segmented, second segment divided, pale brown. Claws with a distinct subapical tooth. Hind legs mutilated in examined specimen. Hemelytra white, tinged with orange, embolium with small, pale brown patches, clavus with characteristic, dark brown pattern in distal part (Fig. 21). Corium with two large, dark patches contiguous with claval suture, cuneus and membrane. Cuneus white at base, tinged with orange in apical part. Membrane pale with small brown and orange spots, venation pale, and minor cell not well visible in examined specimen. Abdomen. Body pale ventrally, abdomen white with brown patches. Female genitalia not examined.
Sexual dimorphism: Male unknown.
Discussion: The new species can be distinguished within the *Peritropis suturella*-group sensu Gorczyca (2006b) by its pale body with contrasting dark scutellum, by its relatively broad vertex with a longitudinal sulcus and by its pale, short antennae.
Hosts: *Peritropis graziae* sp. nov. was recorded only once by fogging, on *Ficus polyantha* (Moraceae).

***Peritropis sulawesica* Gorczyca, 2006b** (Plate 8 fig. 11)
Additional material ISNB: Papua New Guinea: Madang: 1♂: Baiteta, 02.v.1995, O. Missa leg., on *Neonauclea* sp. (Rubiaceae), fogging (FC n° 4850); 1♂: *idem*, on *Terminalia macrocarpa* (Combretaceae) or *Sandolicum* sp. (Melicaceae) or *Dysoxylum patigravianum* (Meliaceae), fogging (FC n° 4177); 4♂: *idem*, 30.vi.1995, O. Missa leg., on *Ficus* sp. (Moraceae), fogging (FC n°s 4844, 4847-4849); 1♂: *idem*, 04.vi.1996, O. Missa leg., on *Buchaniana heterophylla* (Anacardiaceae) or *Vitex cofassus* (Verbenaceae) or *Hernandia ovigera* (Hernandiaceae), light trap (FC n°4846); 1♂: *idem*, 19.vi.1996, O. Missa leg., on *Ficus* sp. (Moraceae), fogging (FC n° 4845).







Figures 13-14. *Peritropis graziae* sp. nov., holotype ♀ FC n° 4178. 13 – Habitus, dorsal view. 14 – Head, lateral view [scale bars 0.5 mm and 0.2 mm respectively].

References: *Peritropis sulawesica* Gorczyca, 2006a: 63, catalogue, cited as "in print"; Gorczyca 2006b: 419-420, as new species; Schuh 2002-2013, online catalogue.
Discussion: *Peritropis sulawesica* Gorczyca 2006b was described on the male holotype from Dumonga-Bone National Park, near Kotambagu, Utara, Sulawesi, Indonesia alone. It has not yet recorded from Papua New Guinea.
Hosts: In Baiteta Forest, the species was recorded mainly by fogging, on *Ficus* sp., on *Neonauclea* sp. and at least on two other unidentified plants.

Vanniini Gorczyca, 1997 sensu Namyatova et al. 2015

***Palaucoris* Carvalho, 1956**

References: *Palaucoris* Carvalho, 1956: 48-49, as new genus; Carvalho 1984c: 81-82, redescription; Schuh 1995: 584, catalogue; Gorczyca 1997: 517-518, 550-552, discussion; Cassis et al. 2003: 131, discussion; Schuh 2002-2013, online catalogue.
Type species: *Palaucoris unguidentatus* Carvalho, 1956, by original designation.

= *Pseudopalaucoris* Ghauri, 1975: 611-612, as new genus, the synonymy by Carvalho 1984c: 81-83.
Type species by original designation: *Pseudopalaucoris novaguineae* Ghauri, 1975.

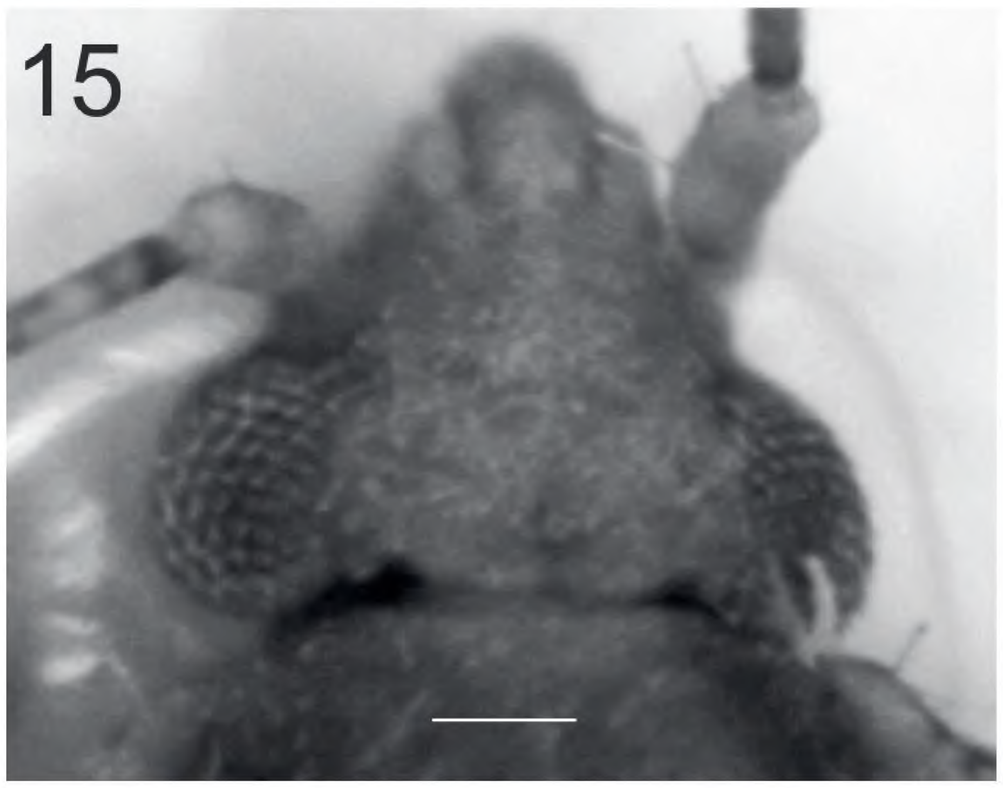
***Palaucoris novaguineae* (Ghauri, 1975)** (Figs 23-34, plate 8 fig. 12, plate 11 figs 6-7)
Additional material 2♂, 1♀ & 1? ISNB: Papua New Guinea: Madang: Baiteta, 03.vii.1995, O. Missa leg., *Artrocarpus incisus* (Moraceae), fogging (FC n°s 5079-5082).

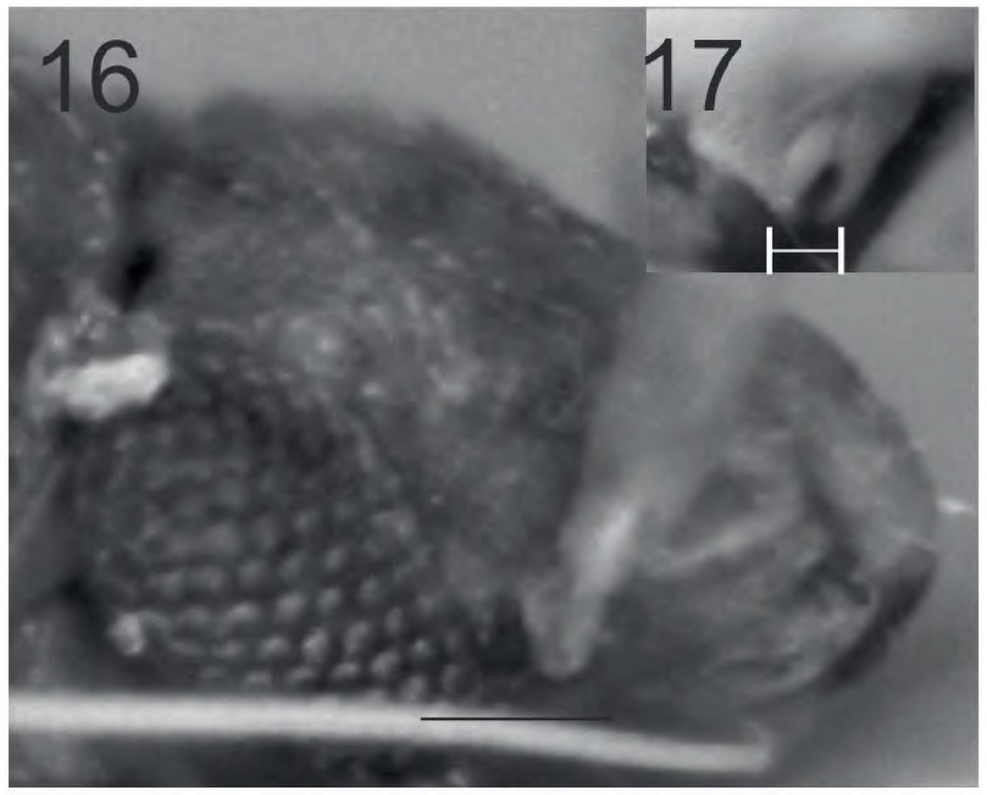
References: *Pseudopalaucoris novaguineae* Ghauri, 1975: 612-613, as new species, DV, head in dorsal and lateral views, claws; *Palaucoris novaguineae*: Carvalho 1984c: 81-84, redescription, syn. nov. and comb. nov., DV, MG; Schuh 1995: 584, catalogue; Konstantinov & Gorczyca 2001: 115, citation in key; Schuh 2002-2013, online catalogue.
Redescription: Body elongate, narrow, total length: 2.68 to 2.75 in males (n = 2), 2.50 in female (n = 1); width of hemelytra (in middle): 0.62 to 0.80 in males (n = 2), impossible to measure on available female. Outer margins of corium strongly curved in the middle, narrowed submedially, widened subbasally and, more

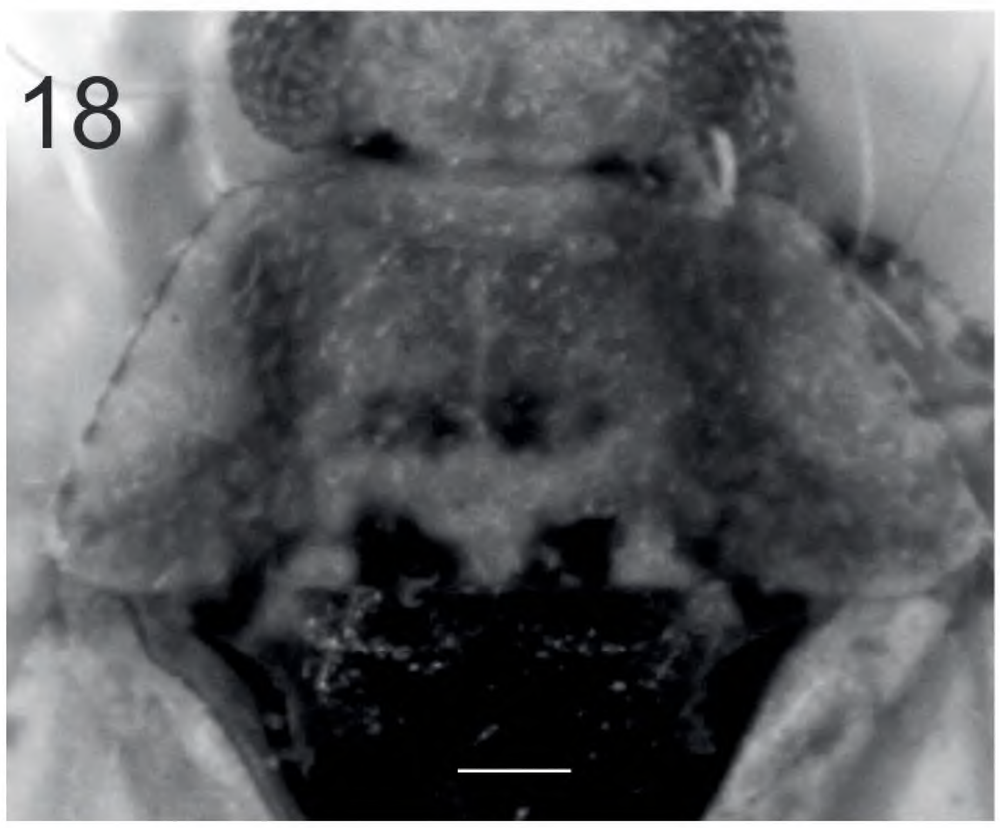


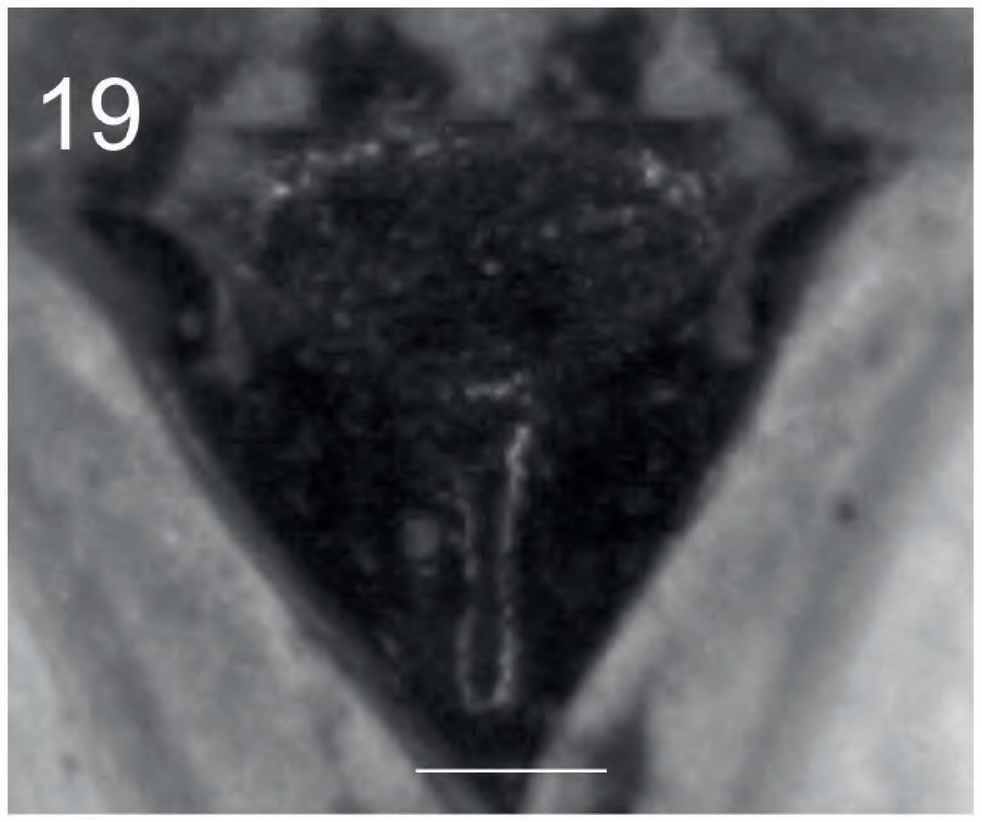



clearly, subapically (Fig. 27, plate 8 fig. 12). Head. Elongate, sub-vertical. Clypeus relatively ventral, concave medially, covered by frons in dorsal view, yellow to brown tinged with red, with few long white setae. Maxillary and mandibular plates uncarinate, devoid of tubercle, widely and deeply punctate, yellow brown, with few long white setae, punctation sometimes dark brown to black, sometimes yellow-brown. Frons vertical, swollen, medially sulcate, slightly shagreened but unpunctate to widely and shallowly punctate, yellow-brown to green-brown, almost glabrous. Eyes large, red, occupying about 2/3 of body height in lateral view. Total width of diatone: 0.50-0.51 in males (n = 2), 0.63 in female (n = 1); width of vertex: 0.20 to 0.24 in males (n = 2), 0.25 in female (n = 1). Vertex yellow-brown



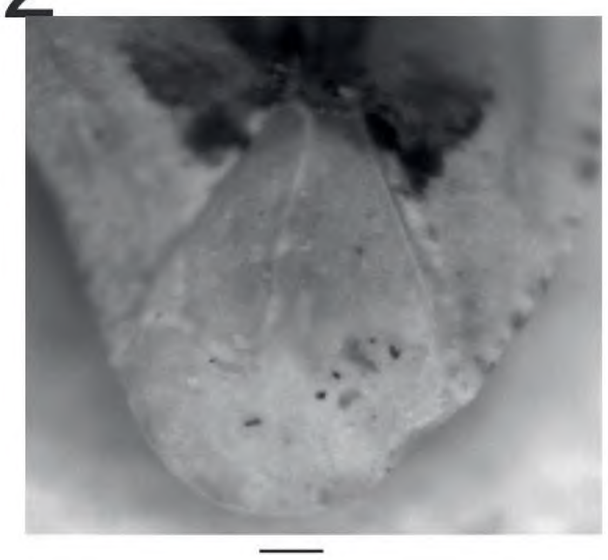










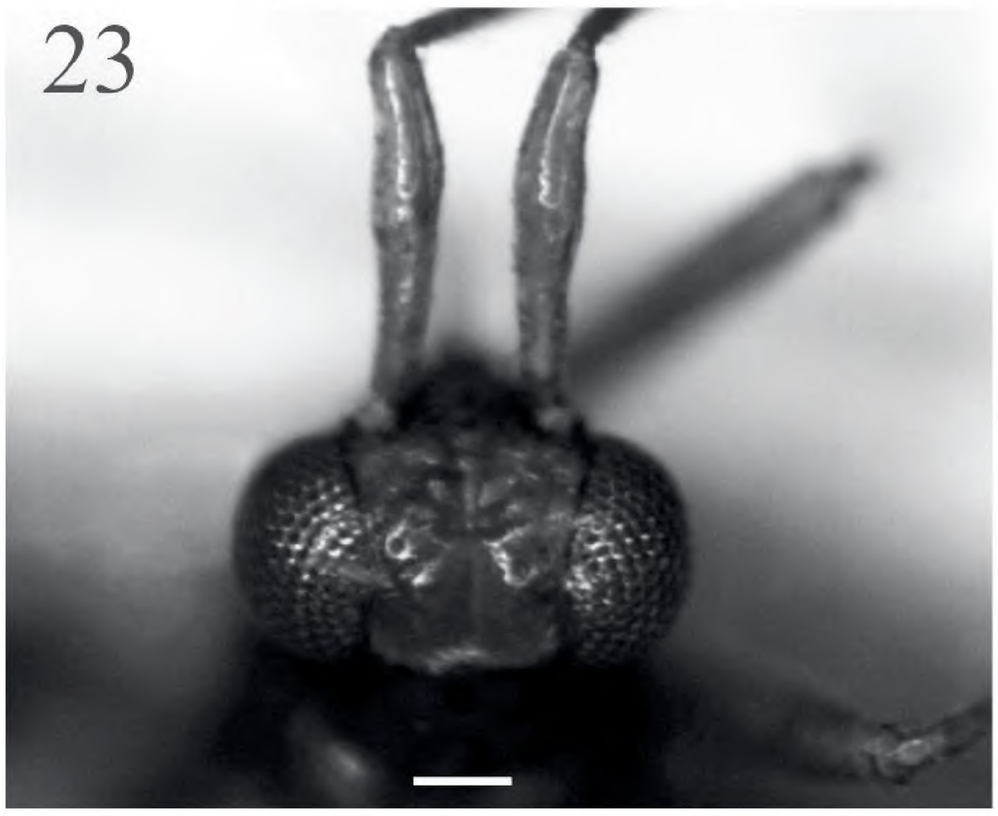


Figures 15-22. *Peritropis graziae* sp. nov. holotype ♀. 15 – Head, dorsal view; 16 – Head, lateral view; 17 – Evaporatory area; 18 – Pronotal surface; 19 – Scutellum, dorsal view; 20 – Left clavus and corium; 21 – Habitus, dorsal view; 22 – Cunei and membrane [scale bar 0.1 mm, except fig. 21 scale bar 1 mm].

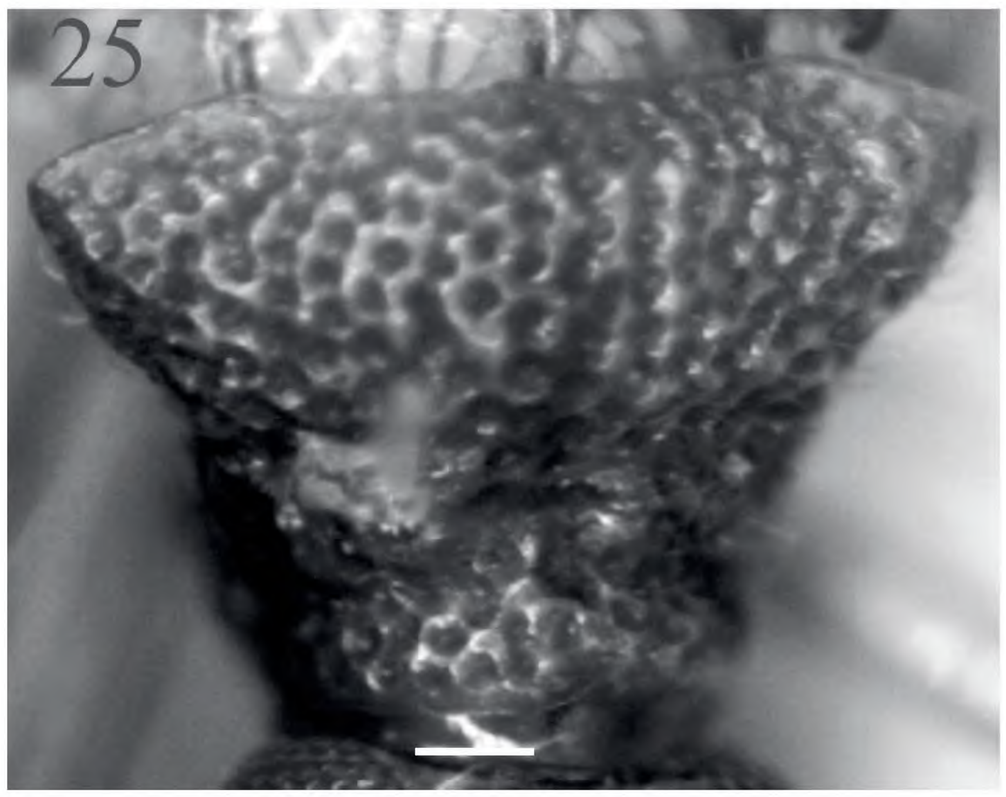




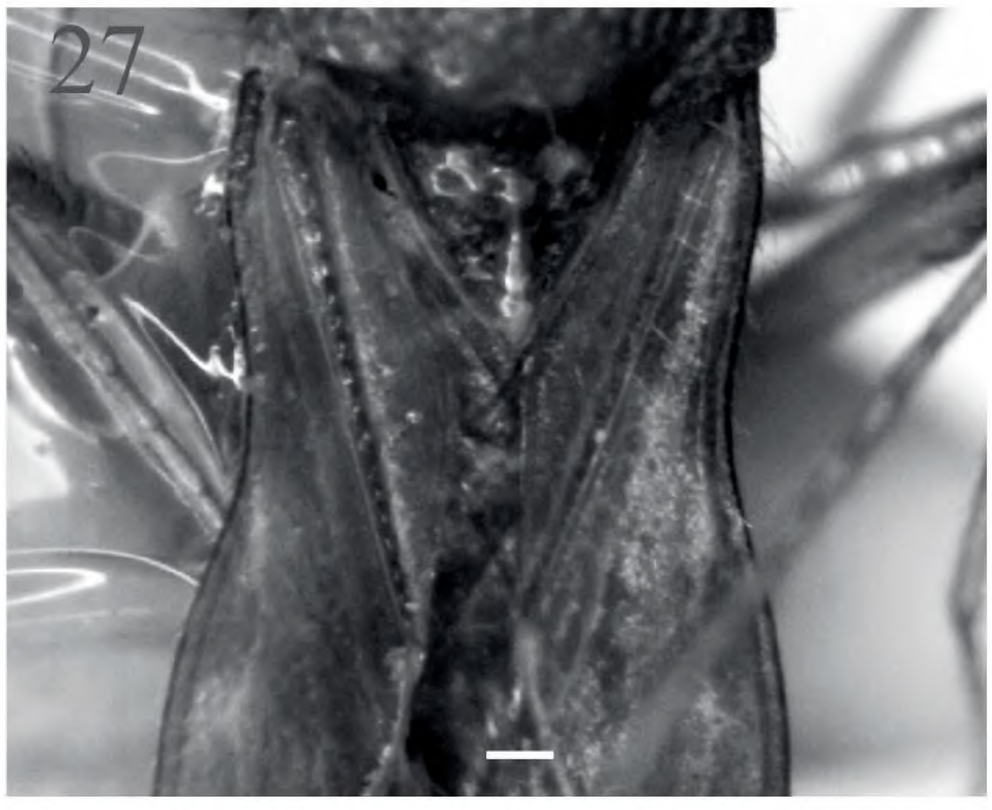

with a red line along eyes, some small sub-erect white setae and pair of elongate white setae close to posterior third of inner margin of eyes. Surface of vertex unpunctate, medially sulcate, with narrow dark-brown to black carinate posterior margin (Figs 23-24). Posterior margin prolonged laterally by small triangular ivory white area. Antenna elongate. First segment yellow-brown, widened medially, club-like; second, third and fourth segments narrower, second yellow-brown, third and fourth dark red-brown. Lengths of joints in males (n = 2 except otherwise mentioned): I: 0.42-0.43, II: 0.97-1.03, III: 0.49 (n = 1), IV: damaged or lacking. Lengths of the joints in female (n = 1): I: 0.49, II: 1.03, III: 0.47 and IV: 0.37. Labium thick, yellow, apically dark red, reaching middle coxae. Thorax. Pronotum (Figs

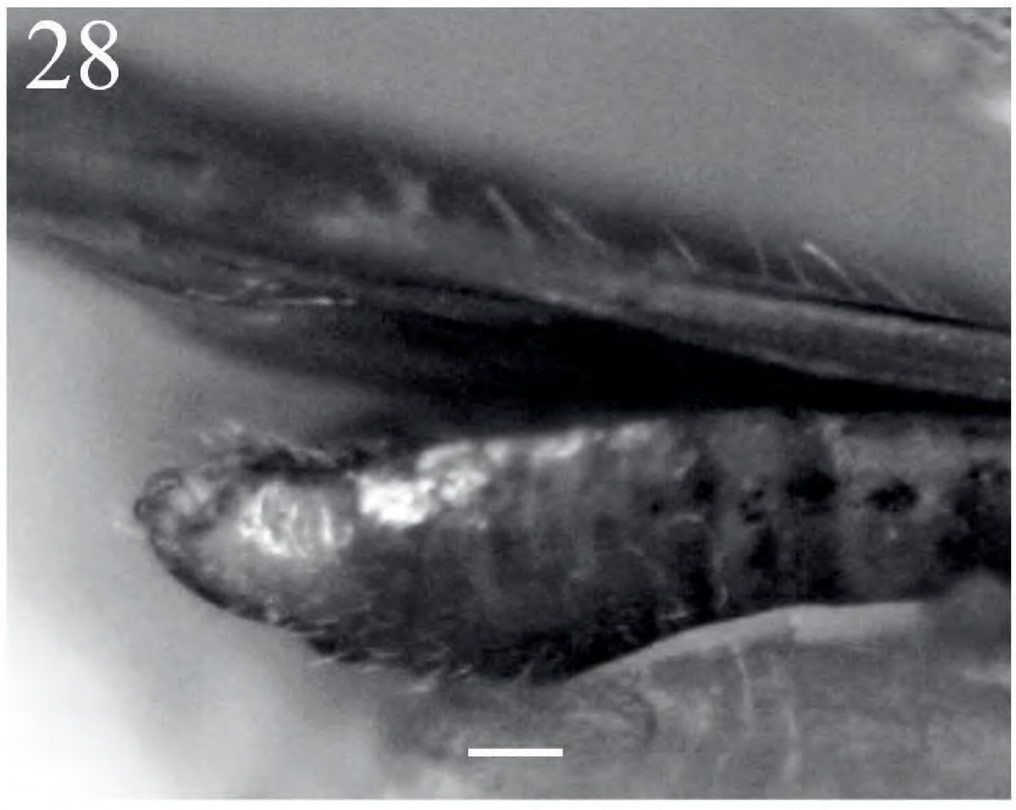






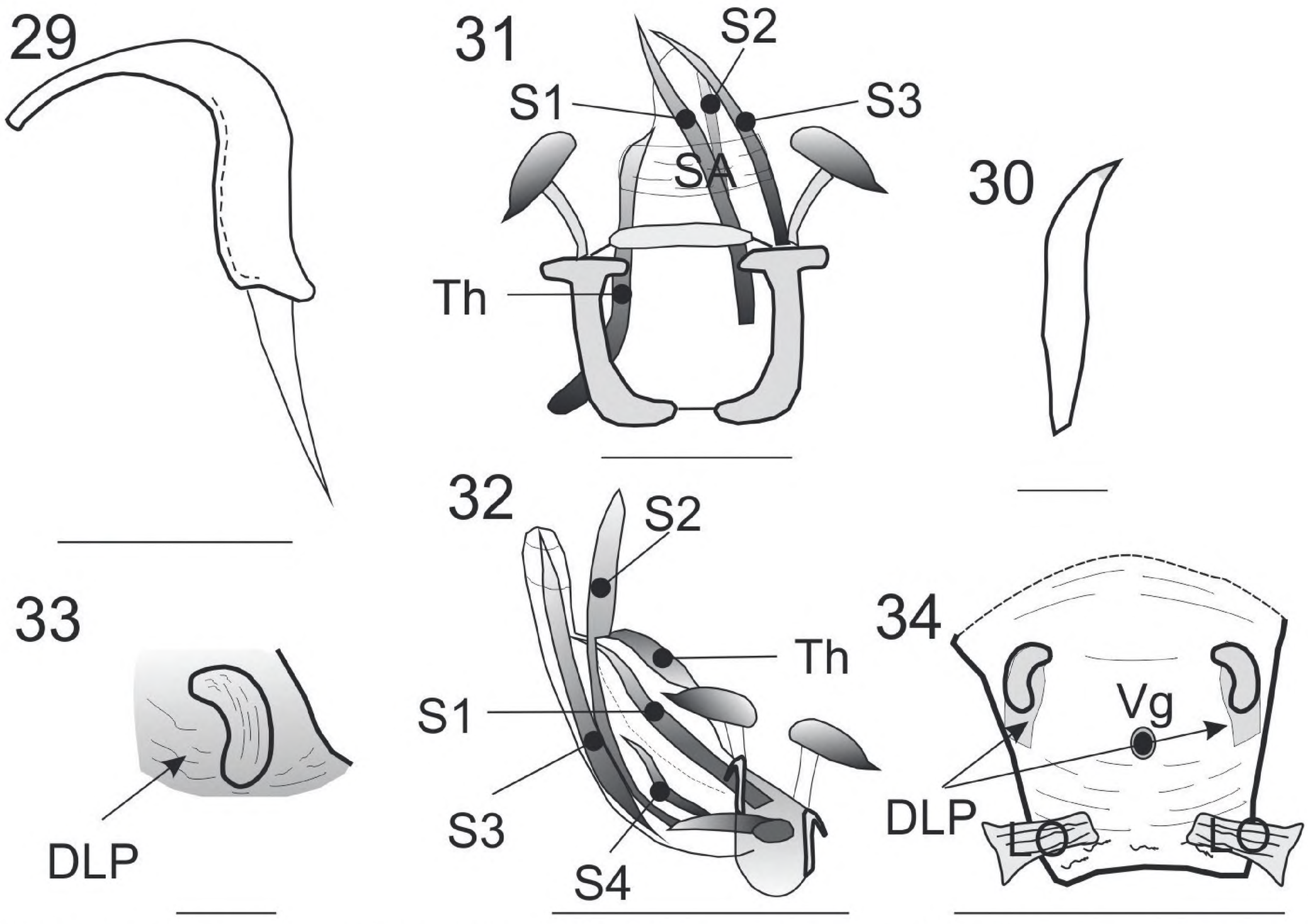






Figures 23-28. *Palaucoris novaguineae* (Ghauri, 1975). 23 – Head, dorsal view (FC n° 5082); 24 – Head and pronotal surface (FC n° 5082); 25 – Pronotal surface, detail (FC n° 5080); 26 – Tarsus and claw (FC n° 5080); 27 – Left clavus and scutellum, dorsal view; 28 – Abdomen, lateral view (FC n°5081) [scale bar 0.1 mm].





Figures 29-34. *Palaucoris novaguineae* (Ghauri, 1975), genitalia of both sexes. 29 – Left parameres, dorsal view; 30 – Right parameres, dorsal view; 31-32 – Endophallus, different views; 33 – Right parieto-vaginal ring, dorsal view; 34 – Dorsal wall, dorsal view [scale bar 0.1 mm, except fig. 30 and 33 scale bar 0.05 mm].

24-25). Total length (collar included) in males (n = 2): 0.54 to 0.61; total length (collar included) in female (n = 1): 0.54. Posterior width in males (n= 2): 0.53 to 0.74; posterior width in female (n = 1): 0.74. Collar large (0.12 to 0.16 in males, n = 2; 0.19 in female, n = 1), medially elevated comparatively to callosities area, with sub-erect white setae. Surface of collar yellow brown, obviously punctate, punctation wide and deep. Callosities rounded, yellow brown, separated medially and from lateral margins of disk. Pronotal disk with numerous, sub-erect white setae, easy to see in lateral view. Pronotal surface yellow brown to red-brown with a wide and deep punctation. Humeral angles rounded, posterior margin of disk slightly curved, lateral margins S-like, lacking carina or carinal knob. Mesoscutum narrow, brown. Scutellum (Fig. 27). Length in males (n = 2): 0.32 to 0.37; length in female (n = 1): 0.33. Basal width in males (n = 2): 0.29 to 0.30; basal width in female (n = 1): 0.32. Surface widely and deeply punctate, with wide ivory white calose medial line absent basally. Legs. Femora yellow-brown, with black spinulae and elongate, sub-erect white setae. Metafemora with suberect, white setae, a row of elongate, strong yellowish spines originating from red-brown tubercles and a row of black spinulae. Tarsus yellow, claws (Fig. 26) red-brown. Hemelytra (Fig. 27). Outer margins of hemelytra and corium strongly curved in middle, narrowed submedially, widened sub-basally and, more clearly, subapically, carinate, carinae red, with relatively long, white setae. Clavus basally opaque, apically slightly translucent, yellow-brown, with a row of deep and wide red-brown punctures along clavo-corial suture. The inner margin of clavus yellow-brown. Pilosity elongate, erect, white (Figs 27-28). Sericeous or woolly setae absent. Corium translucent, yellow-brown, corial vein brown, inner margin yellowish. Pilosity elongate, erect, white. Sericeous or woolly setae absent. Exocorium difficult to separate from endocorium. Cuneus of male small, almost triangular, yellowish, with few suberect black setae. Cuneus of female similar but very difficult to delimitate from small cell of membrane and from corium. Cuneal fracture literally absent. Veins thick, yellow to brown or red, inner margin of corium thick, vein-like, yellow-brown basally, red subapically, yellowish apically. Membrane grey-brown, difficult to separate from endocorium by texture. Large cell in males elongate

and subtriangular basally, not reaching beyond apex of cuneus. Small cell of males reduced, inner margin curved basally, posterior margin straight, thickened near the cuneus. Large cell in females half moon-like. Small cell subtriangular, posterior margin reaching beyond apex of cuneus and related to it by the outer margin. Abdomen: brown with short white setae. Pygophore (Fig. 28).
Male genitalia: Left paramere (Fig. 29) sickle-shaped. Right paramere (Fig. 30) reduced, primary apophysis acute. Phallus or aedeagus (Fig. 31-32) with numerous sclerites (S1-S4) or sclerotised areas (SA, Fig. 31), theca (Th) strongly sclerotised.
Female genitalia: Parieto-vaginal rings (Fig 33) narrow, anterior, latero-outer and posterior margins convex, devoid of sclerite, latero-inner margin concave. Dorsal labiate plate (DLP) sclerotised, lateral oviducts (LO) obviously separated. Dorsal wall membranous (Fig. 34). Posterior wall membranous.
Discussion: The habitus and the very peculiar claws, with large blade-like apically curved parempodia, one divergent, the other convergent, with small pulvilli and with pointed teeth, the widely and deeply punctate pronotum and scutellum, the strongly sclerotised hemelytra apparently lacking cuneus, lead us to include the analysed specimens in the genus *Palaucoris* Carvalho, 1956. The unicolorous body and antennae, the male genitalia and the biareolate membrane are characteristic of *P. novaguineae* (Ghauri, 1975). The habitus of this species is relatively similar to those of several so-called Hyalopeplini (cf. Plate 11 figs 6-7), even if the genus *Palaucoris* is probably related to Vaniini (Namyatova et al. 2015), presently included in Cylapinae. This genus was classified, based on its claw structures, succesively in its own subfamily or in Bryocorinae. Despite its habitus, it differs notably from true Mirinae.
P. novaguineae was described by Ghauri (1975: 612-613), on the basis of the female holotype and two immature paratypes from Papua New Guinea, Western Highlands Province, Jimi River Valley. Carvalho (1984c: 84) mentions additional specimens from Indonesia, Papua Barat (Waghete) and from Papua New Guinea (north west of Kainantu, Eastern Highlands; Goroka, Eastern Highlands; Watut, Morobe).
Hosts: In Baiteta Forest, *P. novaguineae* (Ghauri, 1975) was collected by fogging, only one time, on *Artrocarpus incisus* (Moraceae). The species was also found under bark of *Araucaria husteinii* (Araucariaceae) (Ghauri 1975: 612).

Vanniusoides Carvalho, Lorenzato, 1978

References: *Vanniusoides* Carvalho, Lorenzato, 1978: 127, as new genus; Schuh 1995: 39, catalogue; Gorczyca & Konstantinov 2001: 107, redescription; Cassis et al. 2003: 145, redescription; Gorczyca 2006a: 24, catalogue; Schuh 2002-2013, online catalogue.
Type species: *Vannius brevis* Poppius, 1909, by original designation.

***Vanniusoides brevis* (Poppius, 1909)** (Plate 8 fig. 13)

Additional material: 1♂ ISNB: Papua New Guinea: Madang: Baiteta, 09.vi.1995, O. Missa leg., *Sarcocephalus* sp. (Rubiaceae), fogging (FC n° 5138) (ISNB); East Sepik: 1♀ HNHM: Amok, 06.i.1960, Maa T. C. leg. (Compared with the type by J.M.C. Carvalho) (FC n° 5060).

References: *Vannius brevis* Poppius, 1909: 15-16, as new species; *Vanniusoides brevis*: Carvalho & Lorenzato 1978: 128-129, redescription, DV, MG, new combination; Schuh 1995: 24, catalogue; Gorczyca & Konstantinov 2001: 107-108, redescription, head; Cassis et al. 2003: 146, citation in key; Gorczyca 2006a: 24, catalogue; Schuh 2002-2013, online catalogue.
Discussion: *Vanniusoides brevis* (Poppius, 1909) was described on the basis of the female holotype from Simbang, Huon Golf, Papua New Guinea alone. Few additional specimens were later cited in the literature, from Geelvink Bay, Papua Barat, Indonesia (Carvalho & Lorenzato 1978). The biology of this species is totally unknown. It is also the case for the species of *Vanniusoides* described from the Fiji Islands and Queensland (Cassis et al. 2003: 124). *V. clypeatus* Gorczyca, Konstantinov, 2001 was collected on a river bank, between the stones (op. cit.: 109).
Hosts: In Baiteta Forest, *V. brevis* was recorded only once, by fogging, from *Sarcocephalus* sp. (Rubiaceae).

Deraeocorinae Douglas, Scott, 1865
Deraeocorini Douglas, Scott, 1865

Araspus Distant, 1904

References: *Araspus* Distant, 1904a: 112, as new genus; Carvalho 1984a: 59-60, revision; Schuh 1995: 597, catalogue; Schuh 2002-2013, online catalogue.
Type species by monotypy: *Lopus partilus* Walker 1873b.



***Araspus gressitti* Carvalho, 1984a** (Plate 9 fig. 1)
Additional material ISNB: 1♀: Papua New Guinea: Madang: Baiteta, 11.v.1995, O. Missa leg., host unknown, fogging (FC n° 5119); 1♂: Baiteta, 04.vii.1996, O. Missa leg., *Sloanea sogeriensis* (Eleaocarpaceae), collecting method unknown[3] (FC n° 5120).

References: *Araspus gressitti* Carvalho, 1984a: 62, as new species; Schuh 1995: 597, catalogue; Schuh 2002-2013, online catalogue.
Discussion: *Araspus gressitti* Carvalho, 1984a was described using four specimens of both sexes, all from New Britain, Papua New Guinea. No additional specimen was cited in the literature since Carvalho's original description. The biology of the species is unknown.
Hosts: In Baiteta Forest, one specimen was recorded from *Sloanea sogeriensis* (Eleocarpaceae) with unknown methodology and the other specimen was collected by fogging, on an unknown host plant.

***Baitetacoris* gen. nov.**
Type species: *Baitetacoris turschi* gen. nov., sp. nov.

Derivatio nominis: The new genus is named according to the local place where it was recorded for the first time: Baiteta Forest, Madang, Papua New Guinea. Gender: masculine.
Description: Relatively small, rounded, almost glabrous and shining deraeocorine. Head shorter than pronotum, frons vertical, vertex carinate, unsulcate (Fig. 35). Pronotal collar relatively wide, tomentose. Pronotal disk widely and deeply punctate (Figs 35-36), lacking transverse sulcus, laterally carinate, without callosities. Claws strongly toothed at base, devoid of pulvilli. Scutellum swollen, devoid of tubercles; lateral margins tomentose (Plate 9 figs 9-10). Hemelytra opaque, shining, almost glabrous and unpunctate (Plate 9 fig. 8). Exocorium unicolourous. Membrane glabrous.
Discussion: The rounded habitus, the head shorter than the pronotum, the frons almost vertical, the relatively long antenna, the wide, tomentose pronotal collar, the wide and deep punctation of pronotal disk, the pronotal disk lacking a proeminent, transverse sulcus around the callosities, the reduced callosities, the claws strongly toothed at base but devoid of pulvilli and with setiform parempodia (i.e. unmodified in fleshy, flattened pads, convergent or divergent apically), the opaque hemelytra and the glabrous membrane all lead us to include the taxon in the tribe Deraeocorini of the subfamily Deraeocorinae. *Baitetacoris* cannot be confused with other genera of Papuan Deraeocorini. *Morobemiris* Carvalho, 1985 is a larger bug (total length: 6.8 mm) with a proeminent scutellum. The posterior margin of the pronotal disk near humeral angles of *Gressitocoris* Carvalho, 1985 is concave. The hemelytra of *Karubacoris translucidus* Carvalho, 1985, of all *Papuacoris* Carvalho, 1985 and of all *Deraeocoris* Kirschbaum, 1856 species (including the species originally classified in *Cimicicapsus* Poppius, 1915b[4]) are strongly, widely and deeply, punctate. The clavus and at least the endocorium of *Araspus* Distant, 1904a are also widely and deeply punctate. The anterior area of pronotum of *Karamuicoris* Carvalho, 1985 is divided by four longitudinal ridges. All of these character states are absent in *Baitetacoris* gen. nov. The genera *Angerianus* Distant, 1904c and *Garainamiris* Carvalho, 1981b, both known from Papua New Guinea and classified in Deraeocorini until now, are more elongate, with different scutellum, embolium, antenna, dorsal pilosity etc.
There are few already described deraeocorine species in Australia. Only five genera are cited from the continent: *Deraeocoris* Kirschbaum, 1856, *Eurybrochis* Kirkaldy, 1902a, *Fingulus* Distant, 1904b, *Pseudocamptobrochis* Poppius, 1911c and *Termatomiris* Ghauri, 1975 (Cassis & Gross 1995). All of these genera differ from *Baitetacoris* by the habitus, particularly by the pronotal shape, dorsal punctation, dorsal pilosity and for the most of them the total length.
The Oriental or East Palaearctic genera *Cimidaeorus* Hsiao, Ren, 1983, *Dortus* Distant, 1910a, *Lamprocarnum* Reuter, 1891 and *Paranix* Hsiao, Ren, 1983 can also be separated of the new genus by their habitus, particularly by the hemelytral punctation.
Three of the four genera of Deraeocorini of New Zealand – *Poecilomiris* Eyles, 2006, *Reuda* White, 1878 and *Romna* Kirkaldy, 1906 – have lateral carinae on pronotum, as *Baitetacoris* gen. nov. However, *Poecilomiris* and *Romna* differ by the habitus (mainly their elongate shape, larger size and wide hemelytral punctation), *Reuda* by the

3 The labels are ambiguous about the methodology used to collect this specimen, light or fogging, the both being cited on separate labels.

4 *Cimicicapsus* Poppius, 1915 was treated as a junior synonym of *Deraeocoris* Kirschbaum, 1856 by Schuh (1995) but as valid by some other recent authors (for example: Yasunaga et al. 2001). Its habitus is *Deraeocoris*-like, with a strong dorsal punctation and a relatively long pilosity.






head structure (the oblique frons and vertex are below top of the eyes in this genus according to Eyles 2006). For us, no other deraeocorine genera known around the world could easily accommodate our Papuan specimens. The total length of some of them can be relatively small and inferior to 3 mm (contrarily to Carvalho & Costa 1997), even if it is unusual in the tribe. This is the case for the South and Central American genus *Lundiella* Carvalho, 1951, for our new genus *Missacoris* (cf. hereafter) and for *Baitetacoris*. However, the habitus of the three genera are relatively different. The exocorium (= embolium) of *Lundiella* is widened basally, the cuneus in this genus is strongly declivous and the dorsal pilosity is long and erect (Carvalho & Maldonado 1982). Moreover, the second antennal segment is never club-like in the males, but only in the females of *Lundiella*. *Baitetacoris* gen. nov. is easily separated of *Missacoris* n. gen by the structure of scutellum and hemelytra.

As pointed out by Cassis (1995) and Cassis & Eyes (2006), the tribal classification of Deaeocorinae is unsatisfactory, with the diagnosis of nominal tribes remaining insufficient. At present, no deraeocorine tribe other than Termatophylini could be established for sure as a monophyletic group (Cassis, op. cit.). The tribe Deraeocorini seems to be defined "chiefly on the basis of absent characters" and "basically a taxon that contains the genera that could not be placed within the more narrowly defined tribes" (Cassis 1995: 327). The relationships of the included genera remain to be clarified. Consequently, the relationships of *Baitetacoris* gen. nov. to the other deraeocorine genera are still totally unknown. On the base of external anatomy alone, *Baitetacoris* gen. nov. could be related to *Lundiella* Carvalho, 1951.

***Baitetacoris turschi* sp. nov.** (Figs 35-43, plate 9 figs 8-10)

Holotype ♂ ISNB: Papua New Guinea: Madang: "*Baitetacoris turschi* gen. nov., sp. nov. FC n° 5113. Det. F. Chérot, 2011" / "Holotype" / "Holotype *Baitetacoris turschi* Chérot, Gorczyca, Schwartz & Demol" / "Coll. I. R. Sc. N. B., Canopy mission P. N. G., Madang Province, Baiteta, FOG AR43, 17.iv.1996, Leg. O. Missa" [the code FOG corresponds to fogging and the code AR43 to an unidentified host plant] (FC n° 5113).

Paratypes 6 specimens ISNB: 1♂: Baiteta, 10.v.1995, O. Missa leg., *Chisocheton ceramicus* (Meliaceae), fogging (FC n° 5114); 4♂: Baiteta, 16.v.1995, O. Missa leg., *Celtis philippinensis* (Ulmaceae), fogging (FC n°s 5109-5112); 1♂: Baiteta, 06.vi.1995, O. Missa leg., *Celtis philippinensis* (Ulmaceae), fogging (FC n° 5115).

Derivatio nominis: The new species is dedicated to our esteemed colleague and friend Prof. Bernard Tursch (Free University of Brussels, Belgium), for his important contribution to classification of the genus *Oliva* (Mollusca) and in remembrance of the numerous stimulating discussions about taxonomy in his laboratory during the PhD of the first author.

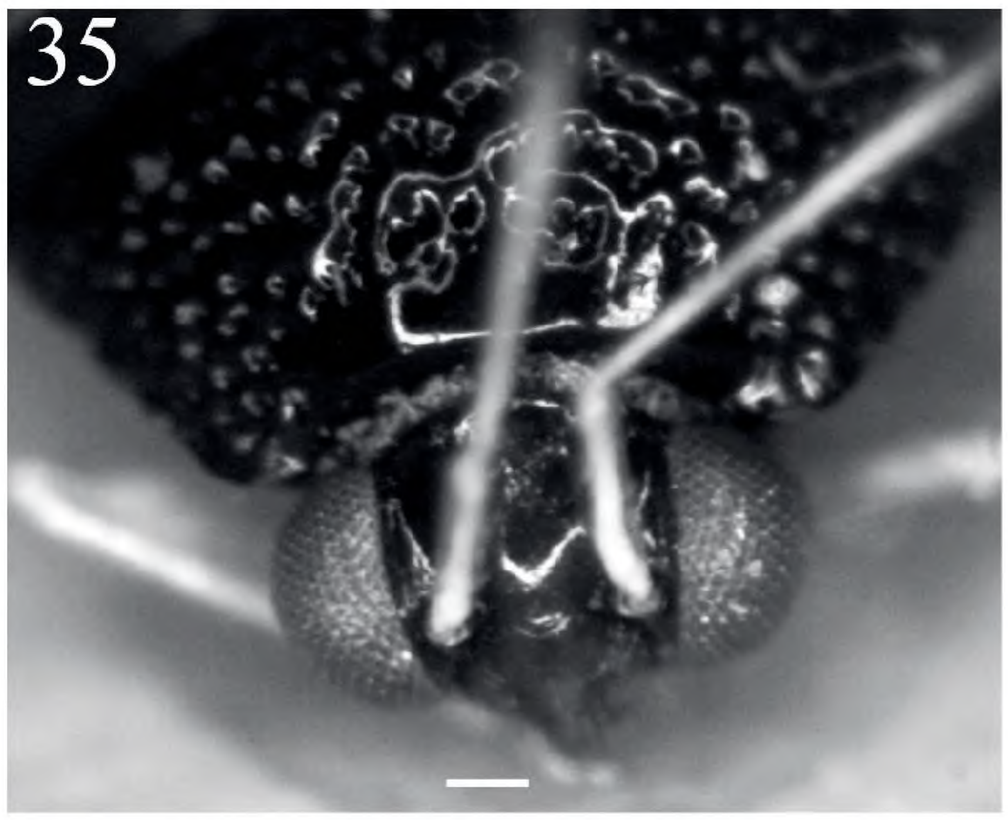
Description: Small-sized rounded deraeocorine (Plate 9 fig. 8), total length (in dorsal view): 1.81 to 2.2, maximal width of hemelytra (slightly under apex of scutellum): 1.13 to 1.27. Head. Clypeus free, not covered by the frons in dorsal view, red-brown, with short, suberect, white setae. Maxillary and mandibular plates small, uncarinate, lacking tubercle, red brown to black, bearing relatively long, erect, white setae. Frons slightly rounded, not striate, bright red brown to black, almost glabrous (Fig. 35). Eyes large, glabrous, red-brown to grey, occupying majority of head height in lateral view. Total width of diatone: 0.61 to 0.67, width of vertex: 0.27 to 0.30. Vertex slightly carinate, narrow carina black. Middle of vertex unsulcate, bright red brown, almost glabrous, slightly striate. Antenna relatively short. First and second segments relatively thick, yellowish, second red-brown and club-like apically. Third and fourth segments narrower, yellow to brown. Pilosity of joints white, sub-erect, stiff, slightly longer than width of second segment. Lengths of the joints: I: 0.27 to 0.36, II: 0.91 to 1.02, III: 0.22 to 0.26 and IV: 0.20 to 032. Thorax. Pronotum (Fig. 36). Total length (collar included): 0.61 to 0.73, posterior width: 1.12 to 1.28. Collar relatively large (medial length: 0.03 to 0.05), dull, grey. Pronotal callosities apparently absent. Pronotal disk almost glabrous. Pronotal surface shining red brown to black with large and deep black punctation, punctation locally fused and forming a complex reticulated web. Anterior part of disk, along collar, shining black, lacking punctation. Posterior margin of disk concolorous. Lateral margins of disk each with black carina. Mesoscutum totally covered (Plate 9 fig. 8). Scutellum glabrous, smooth, swollen (Fig. 39), unicolourous red brown (Plate 9 fig. 9). Length: 0.49 to 0.55, basal width: 0.47 to 0.61. Lateral margins tomentose, grey (Fig. 36, plate 9 figs 9-10). Legs. Yellow. Metafemora with brown spinulae and with yellowish, relatively short spines. Segments of tarsi yellow-brown, claws brown. Hemelytra bright (Plate 9 fig. 8), almost smooth i.e. unpunctate and very slightly striate with short, erect, sparse, white setae. Clavus opaque, dark brown. Endocorium opaque, claval vein black. Exocorium rounded, explaned, red-brown, sometimes with long, curved,

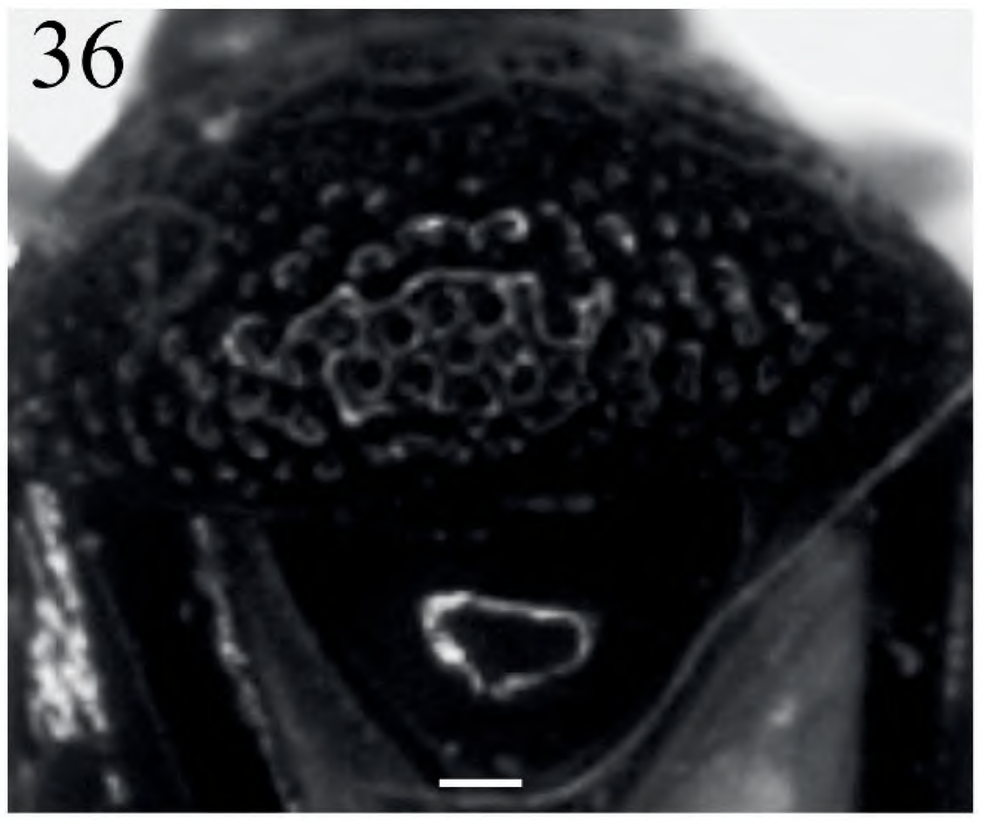


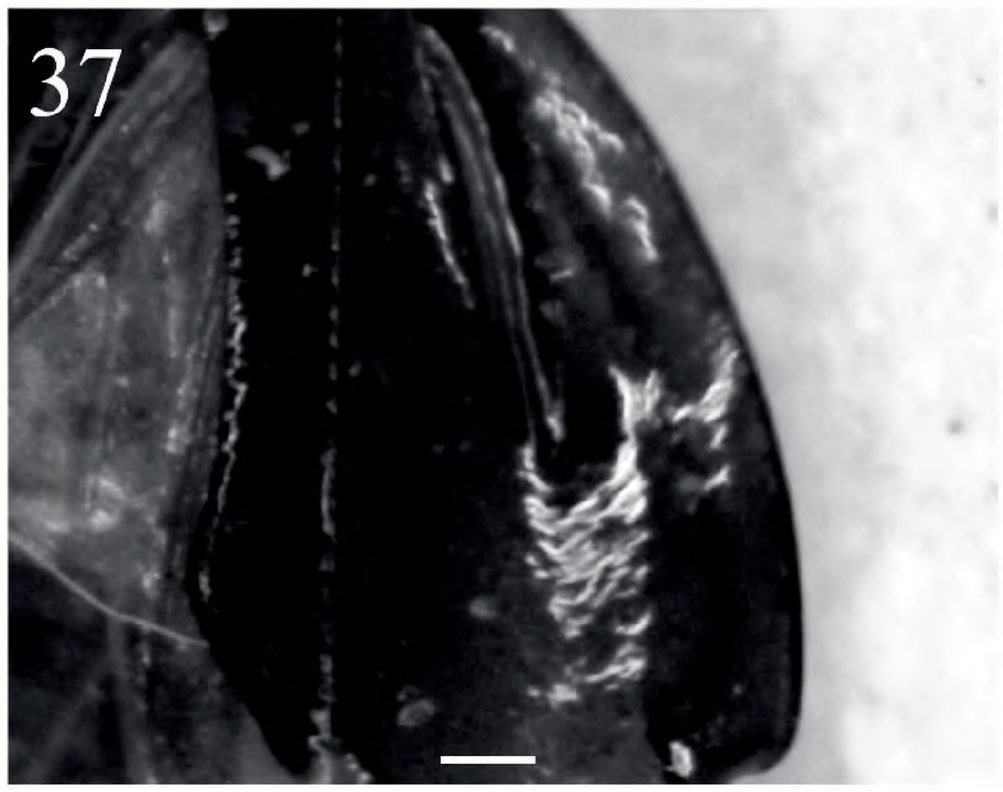


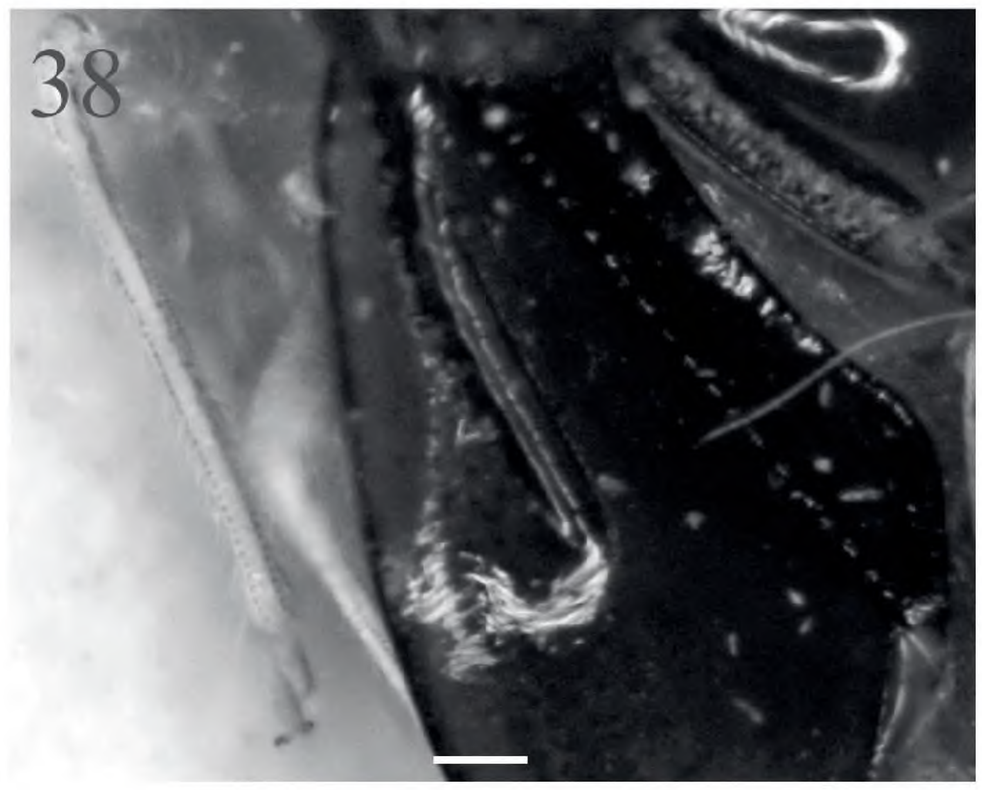
black line rising apically (Fig. 37). Outer margins of exocorium red brown. Embolio-corial suture black with line of large black punctations. Cuneus brown, rounded and curved. Length of cuneus: 0.22 to 0.41, width of cuneus: 0.13 to 0.23. Membrane white, veins yellowish. Abdomen black, with long white setae (Fig. 40). Pygophore (Fig. 41).

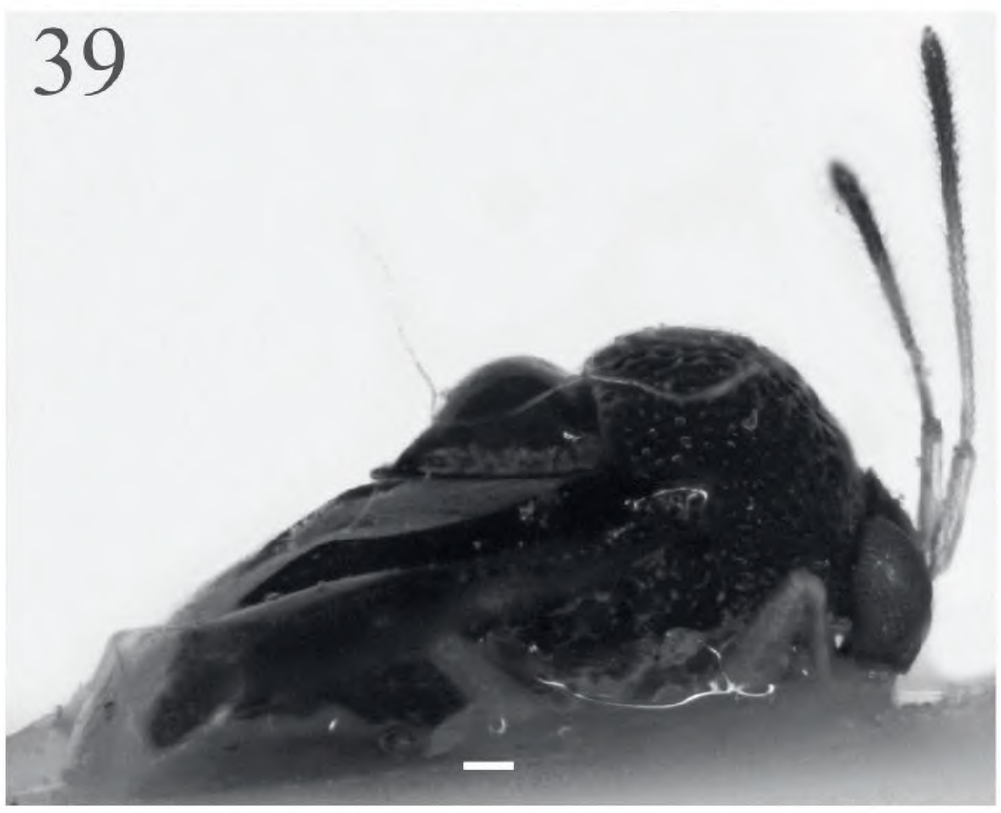
Male genitalia: Left paramere (Fig. 42) wide, with large basis and secondary apophysis. Right paramere reduced (cf. Fig. 41, Rp), primary apophysis acute. Phallus or aedeagus (Fig. 43) with membranous lobe, sclerotised theca and basal sclerite. *Ductus seminis* and secondary gonopore minute.

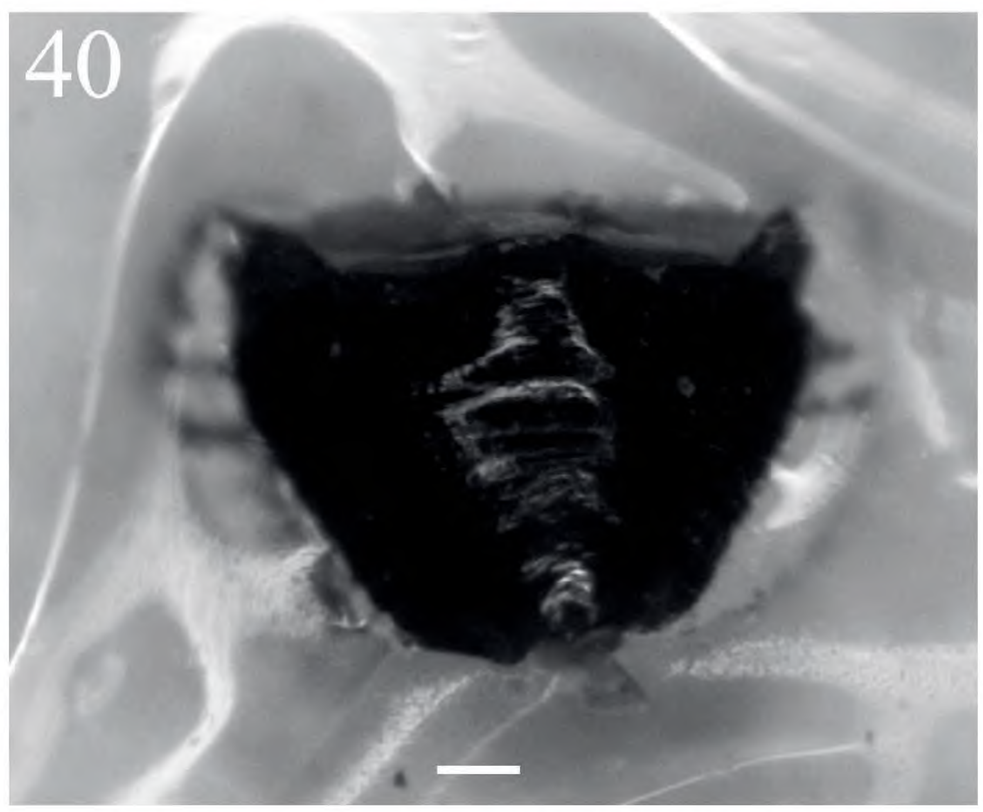












Figures 35-40. *Baitetacoris turschi* gen. nov., sp. nov. 35– Head, frontal view (paratype FC n° 5109); 36 – Pronotal surface (paratype FC n° 5109); 37 – Right corium (paratype FC n° 5109); 38 – Left mesotibia and hemelytra (paratype FC n° 5109); 39 – Habitus, lateral view (paratype FC n° 5109); 40 – Pygophore (holotype FC n°5113) [scale bar 0.1 mm].



Sexual dimorphism: Female unknown.
Discussion: *Baitetacoris turschi* gen. nov., sp. nov. can easily be recognised by its habitus. From *Missacoris* gen. nov., *Baitetacoris* gen. nov. can be separated by its scutellum lacking three sub-basal tubercles but with tomentose wide lateral margins and by the structures of its hemelytra.
Hosts: *Baitetacoris turschi* gen. nov., sp. nov. was recorded by fogging, in four independent collection events, on two different host plants: *Chisocheton ceramicus* (Meliaceae) and *Celtis philippinensis* (Ulmaceae).

***Fingulus* Distant, 1904b**

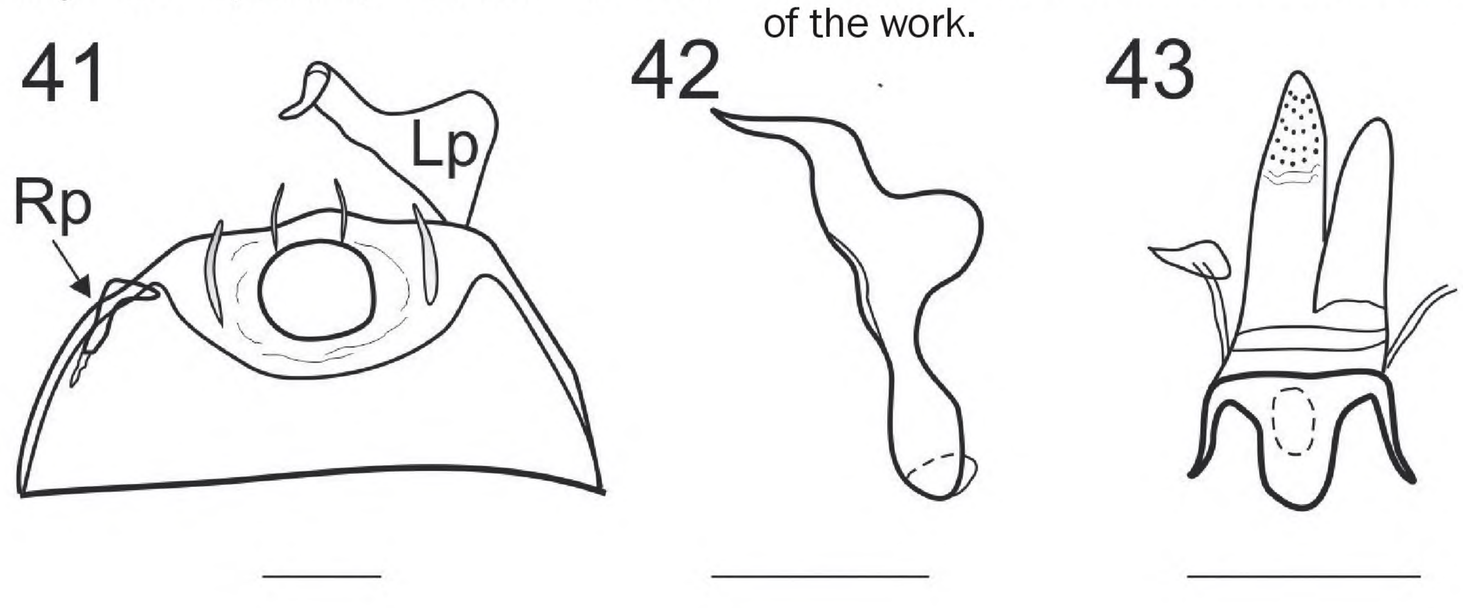
References: *Fingulus* Distant, 1904b: 275, as new genus; Stonedahl & Cassis 1991: 5-10, redescription, key of species; Schuh 1995: 626-627, catalogue; Schuh 2002-2013, online catalogue.
Type species: *Fingulus atrocaeruleus* Distant, 1904b, by monotypy.

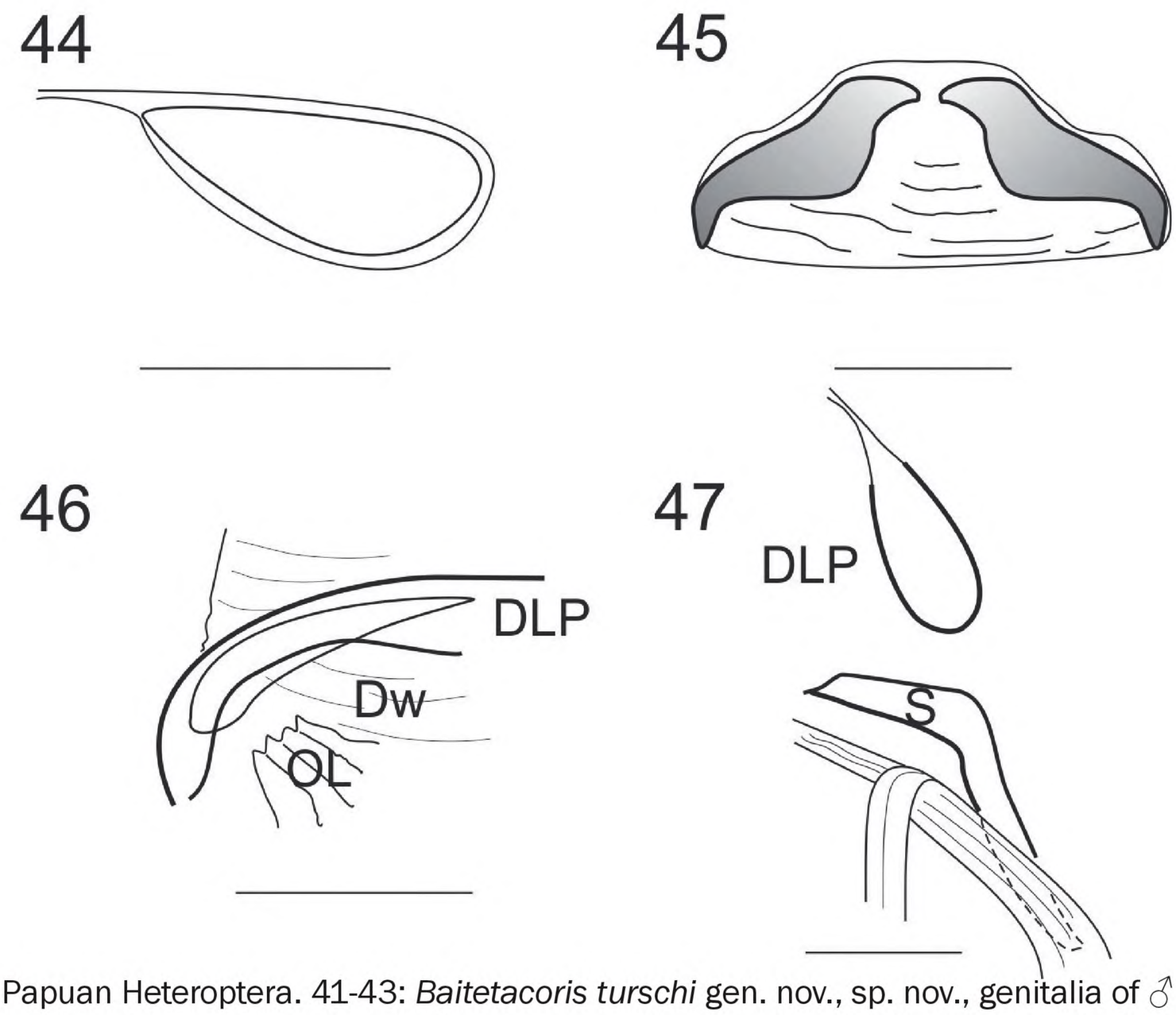
***Fingulus novobritanicus* Stonedahl, Cassis, 1991**
(Plate 9 fig. 2)

Additional material 1♀ ISNB: Papua New Guinea: Madang: Baiteta, 11.vi.1996, O. Missa leg., host unknown, light trap (FC n° 4143).

References: *Fingulus novobritanicus* Stonedahl, Cassis, 1991: 38-39 [5].
Discussion: *Fingulus novobritanicus* Stonedahl, Cassis, 1991 was described on four specimens of

5 This species was omitted by Schuh (1995) in his catalogue. It is not introduced yet in the online version of the work.





Figures 41-47. Papuan Heteroptera. 41-43: *Baitetacoris turschi* gen. nov., sp. nov., genitalia of ♂ paratype FC n° 5113. 41 – Pygophore, dorsal view; 42 – Left parameres; 43 – Phallus; 44-45: *Missacoris sigwaltae* gen. nov., sp. nov., genitalia of holotype ♀: 44 – Parieto-vaginal rings, dorsal view; 45 – Posterior wall; 46-47: *Garainamiris antennatus* Carvalho, 1981b, ♀ FC n° 4149: 46 – Parieto-vaginal rings, dorsal view; 47 – Right S Sclerite, dorsal view [scale bar 0.1 mm, except figs 41-42 scale bar 0.05 mm].



both sexes from Papua New Guinea, two from East New Britain, one from Madang and one from Milne Bay Provinces. The biology of this species is totally unknown. However, according to Stonedahl & Cassis (1991: 8), most species of the genus could be generalized predators with little or no host plant specificity and several species have been taken in light traps.

Fingulus sp.

Additional material ISNB: Papua New Guinea: Madang: 1♂: Baiteta, 08.vi.1995, O. Missa leg., *Hapholobus* sp. (Burseraceae), fogging (FC n° 4148); 1♀: Baiteta, 24.vii.1996, O. Missa leg., fogging (FC n° 4147).

Discussion: We were not able to identify these two small *Fingulus* specimens to species level.

***Missacoris* gen. nov.**

Type species: *Missacoris sigwaltae* gen. nov., sp. nov.

Derivatio nominis: The new genus is dedicated to our good colleague Olivier Missa (University of York, United Kingdom), who collected – in the framework of his PhD about Curculionidae biodiversity at ULB and ISNB – not only the specimens studied in the present work, but also a lot of other invertebrates, including numerous true bugs, in Baiteta Forest. Without Oliver's hard work, we would not have obtained such an interesting collection, with accurate data on host plants. Gender: masculine.

Description: Relatively small, rounded, almost glabrous and shining deraeocorine. Head shorter than pronotum, frons vertical, vertex carinate, unsulcate (Fig. 48). Pronotal collar wide, tomentose. Pronotal disk widely and deeply punctate (Figs 48, 50), lacking transverse sulcus, laterally carinate, callosities reduced. Claws strongly toothed at base, lacking pulvilli. Scutellum swollen, with three subbasal blunt tubercles (Plate 9 figs 4-7). Hemelytra opaque, shining, almost glabrous and unpunctate (Plate 9 fig. 7). Exocorium rounded, narrowed submedially on inner margin, opaque, ivory-white, with brown patche, red-brown outer margin and wide brown spoon-like to leaf-like stripe on submedial part of inner margin. Membrane glabrous.

Discussion: The head shorter than the pronotum, the vertical frons, the relatively long antenna, the wide, tomentose pronotal collar, the wide and deep punctation of pronotal disk, the pronotal disk lacking a proeminent, shining, transverse sulcus around the callosities, the reduced callosities, the claws strongly toothed at base but lacking pulvilli and with setiform parempodia (i.e. unmodified in fleshy, flattened pads, convergent or divergent apically), the opaque hemelytra and the membrane glabrous all led us to include the taxon in the tribe Deraeocorini of the subfamily Deraeocorinae. *Missacoris* can hardly be confused with other genera of Papuan Deraeocorini. When we use Carvalho's (1985: 448) key of Deraocorinae from Papua New Guinea (in fact a key of Deraeocorini, the Saturniomirini being excluded as the paper only concerns one tribe according to its title), we are not able to go beyond point number 1: our specimen is small (2.9 mm) in contrast to *Morobemiris giluwensis* Carvalho, 1985, the sole species included in the genus *Morobemiris* Carvalho, 1985. However, the scutellum of our specimen is strongly proeminent (as *Morobemiris* and contrarily to the other genera cited in the key), but raised subbasally in three blunt tubercles (in not subapically in one tubercle). The genera *Angerianus* Distant, 1904c, *Araspus* Distant, 1904a and *Garainamiris* Carvalho, 1981b, all known from Papua New Guinea and classified in Deraeocorini until now, were omitted by Carvalho (1985). Fortunately, they were reviewed recently (Carvalho 1981b, 1984a; Stonedahl 1991) and several illustrations of the habitus of some included species were provided in the literature. We can exclude our specimen from these genera: their species are more elongate, with different scutellum, embolium, antenna, dorsal pilosity etc. A comparison with other deraeocorine genera on a World-scale is more difficult, because the available key (Carvalho 1955) is totally outdated. As already pointed out, the Australian deraeocorine fauna is relatively poor, including only five genera: *Deraeocoris*, *Eurybrochis*, *Fingulus*, *Pseudocamptobrochis* and *Termatomiris* (Cassis & Gross 1995). The membership of our Papuan specimen to these genera can be excluded by the habitus, particularly by the pronotal shape, dorsal punctation and dorsal pilosity. The membership to the Oriental or east Palaearctic genera *Cimidaeorus*, *Dortus*, *Lamprocarnum* and *Paranix* can also be excluded by the habitus of these taxa, particularly by the hemelytral punctation. Three of the four genera of Deraeocorini of New Zealand – *Poecilomiris*, *Reuda* and *Romna* – have lateral carinae on pronotum, as *Missacoris* gen. nov. However, *Poecilomiris* and *Romna* differ by the habitus (mainly their elongate shape, larger size and wide hemelytral punctation), *Reuda* by the head structure (the oblique frons





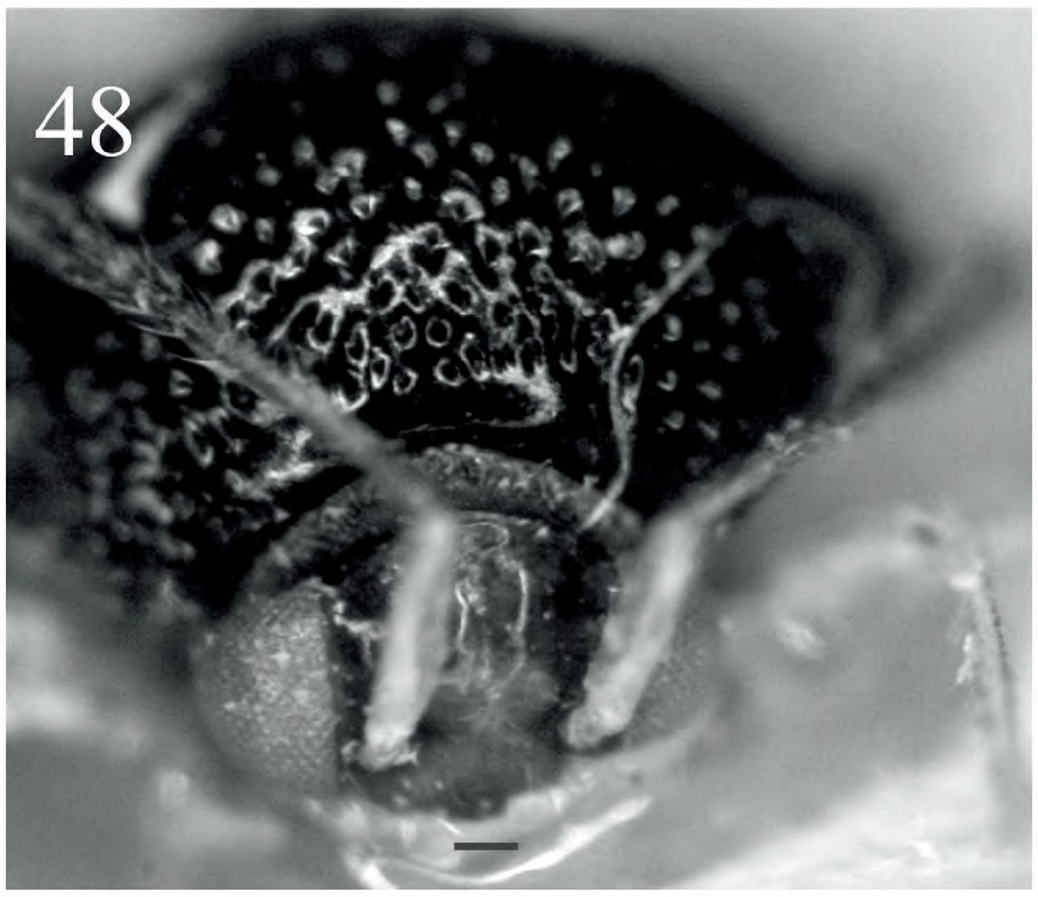

and vertex are below top of the eyes in this genus according to Eyles 2006). We were not able to find any similar deraeocorine genus to *Missacoris* gen. nov. elsewhere in the world. Consequently, we feel free to describe our specimen as a new genus. The relationships of *Missacoris* gen. nov. to other Deareacorini are totally unknown, a phylogenetic analysis of the tribe on a world-scale is still lacking.

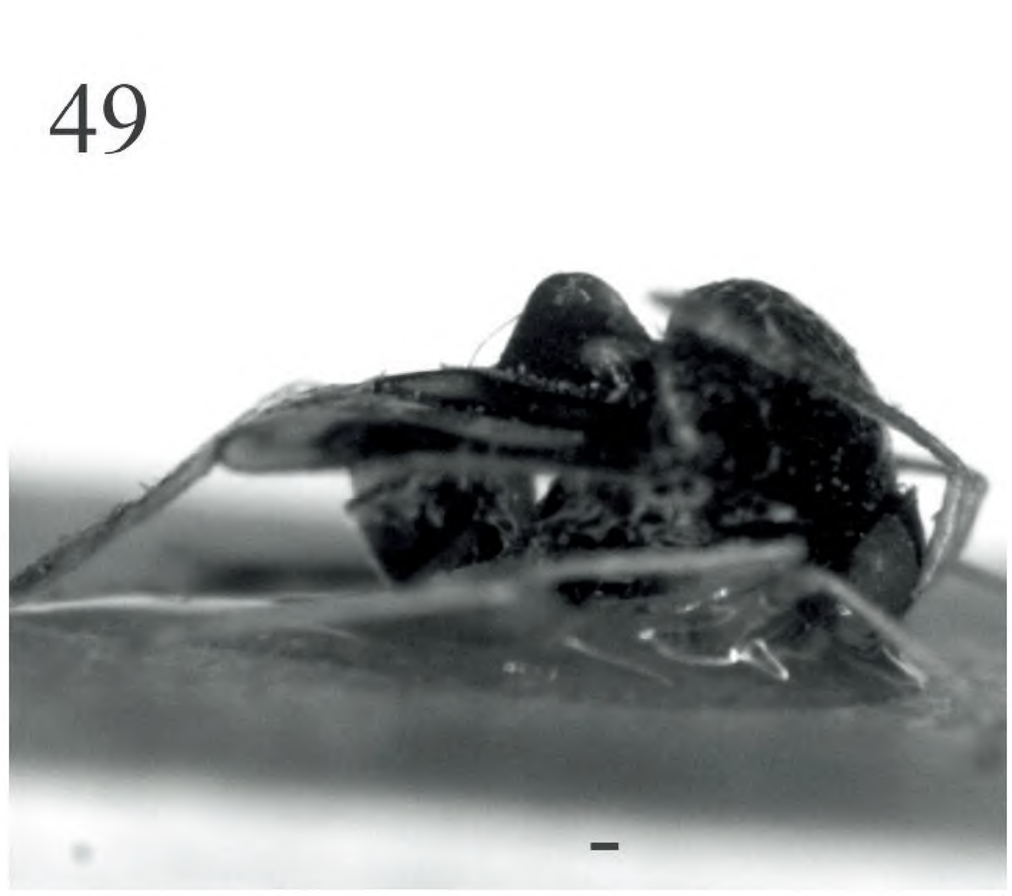
***Missacoris sigwaltae* sp. nov.** (Figs 44-45, 48-52, plate 9 figs 4-7)

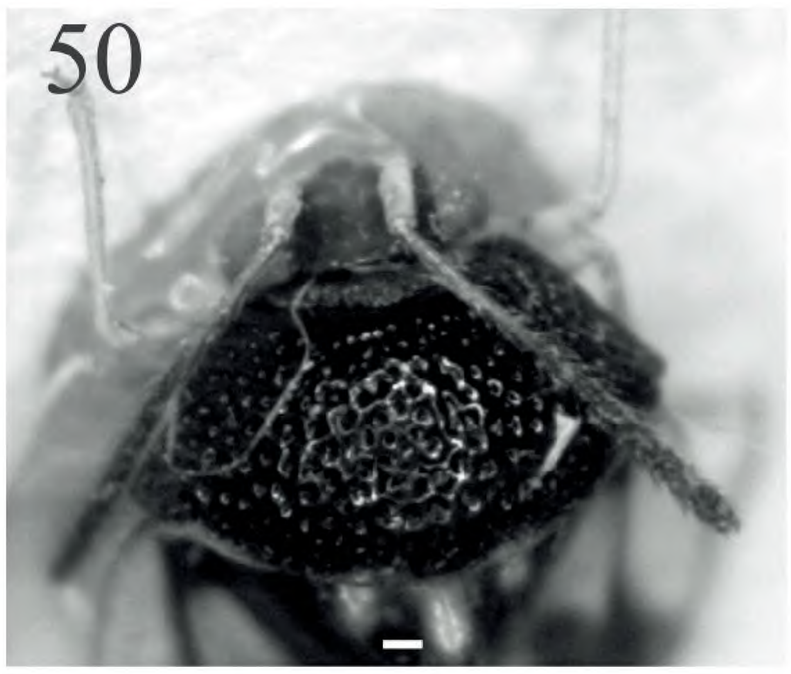
Holotype ♀ ISNB: Papua New Guinea: Madang: "*Missacoris sigwaltae* gen. nov., sp. nov. FC n° 4174. Det. F. Chérot, 2011" / "Holotype" / "Holotype *Missacoris sigwaltae* Chérot, Gorczyca, Schwartz & Demol" / "Coll. I. R. Sc. N. B., Canopy Mission P. N. G., Madang Province, Baiteta, FOG AR 50, 25.vii.1996, Leg. O. Missa" [the code FOG corresponds to fogging and the code AR50 to an unidentified host plant] (FC n° 4174).

Derivatio nominis: The new species is dedicated to our esteemed colleague Dr. D. Pluot-Sigwalt (Museum National d'Histoire naturelle, Paris, France), for her invaluable contribution to the study of the morphology and anatomy of several poorly known Heteroptera, particularly in the families Anthocoridae, Cydnidae, Lygaeidae s. l., Miridae, Pyrrhocoridae and Reduviidae and for the kind help she always provided to the first author during his stays at Paris' Museum.

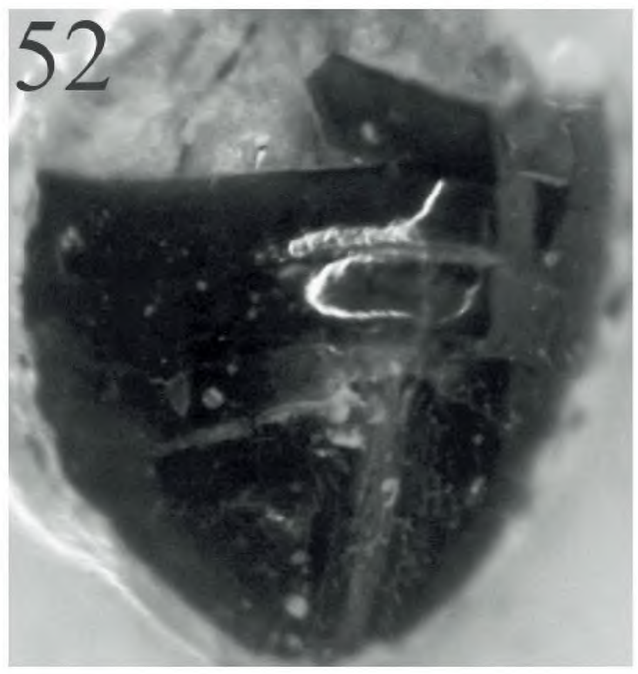
Description: Relatively small-sized rounded Deraeocorine (Plate 9 fig. 4) - total length (in lateral view): 2.94, maximal width of hemelytra (at level of apex of scutellum): 1.69 - with a swollen tuberculate scutellum (Fig. 49, plate 9 fig. 5). Head. Clypeus free but almost not visible in dorsal view, black, apparently glabrous. Maxillary and mandibular plates small, partially glued, apparently uncarinate, lacking tubercle, orange brown. Frons slightly rounded, not striate, shining orange brown with red brown to black stripes along eyes and sparse, short, recumbent or suberect, white setae, without sericeous or woolly setae (Fig. 48). Eyes large, glabrous, pinkish, occupying majority of head height in lateral view. Total width of diatone: 0.70,











Figures 48-52. *Missacoris sigwaltae* gen. nov., sp. nov., holotype ♀. 48 – Head, lateral view; 49 – Pronotum and scutellum, lateral view; 50 – Pronotal surface; 51 – Scutellum, dorsal view; 52 – Abdomen, ventral view [scale bar 0.1 mm].



width of vertex: 0.32. Vertex carinate, unsulcate medially, shiny red brown, almost glabrous. Antenna elongate. First segment thick, yellowish. Second, third and fourth segments narrower, second slightly club-like, yellow to orange with a lateral red brown stripe basally, red brown to black apically, third and fourth yellow. Pilosity white, sub-erect, stiff, shorter than width of first segment but obviously longer than width of following segments. Lengths of joints: I: about 0.43, II: 1.53, III: about 0.44 and IV: about 0.25 (measurements are made on left antenna, two last segments of right antenna being lacking; unfortunately segments of left antenna are not perfectly straight). Thorax. Pronotum (Fig. 50). Total length (collar included): 0.79, posterior width: 1.26. Collar relatively large (medial length: 0.15), dull, grey, with numerous small black callosities. Pronotal callosities apparently absent. Pronotal disk almost glabrous. Pronotal surface shining red brown to black with large and deep black punctation, punctation locally fused and forming complex reticulated web. Anterior part of disk, along collar, shining black, lacking punctation. Posterior margin of disk yellow to whitish. Lateral margins of disk each with black carina. Mesoscutum totally covered in middle, laterally black (Plate 9 fig. 6). Scutellum glabrous, swollen, red brown, with two lateral and a medial ivory-white tubercles (Plate 9 figs 6-7). Length: 0.55, basal width: 0.75. Legs. Yellow. Metafemora with sub-erect, yellowish setae, black spinulae and white to yellowish spines. Segments of tarsi yellow, claws brown. Hemelytra glabrous, shiny, almost smooth i.e. unpunctate and very slightly striate (Plate 9 fig. 4). Clavus opaque, basally dark brown, medially brown, apically ivory-white, margins darker, red-brown. Endocorium opaque, ivory-white, with large subapical brown patches. Exocorium rounded, narrowed submedially on inner margin, opaque, ivory-white, with brown patch, red-brown outer margin and wide brown spoon-like to leaf-like stripe on submedial part of inner margin. Cuneus yellowish, inner margin with an apical brown stripe. Length of cuneus: 0.32, width of cuneus: 0.25. Membrane brown medially, yellowish laterally, veins brown. Abdomen: black, with long white setae.

Female genitalia: Parieto-vaginal rings thin, hardly visible (Fig. 44). Posterior wall (Fig. 45) membranous, with a pair of sigmoid lateral sclerites. Male unknown.

Discussion: *Missacoris sigwaltae* gen. nov., sp. nov. can easily be recognised by its habitus. No Papuan Dereaocorine is similar to this strange animal.

Hosts: unknown.

***Papuacoris* Carvalho, 1985**

References: *Papuacoris* Carvalho, 1985: 465-466, as new genus; Schuh 1995: 630, catalogue; Schuh 2002-2013, online catalogue.

Type species: *Deraeocoris colocasiae* (Poppius, 1915a), by original designation.

***Papuacoris vittatus* (Reuter, 1908)** (Plate 9 fig. 3)

Additional material 1♀ ISNB: Papua New Guinea: Madang: Branman Miss., 05.v.1988, Station 16, leg. J. VanStalle (FC n° 5116).

References: *Camptobrochis vittatus* Reuter, 1908: 188, as new species; *Papuacoris vittatus*: Carvalho 1985: 470, redescription, comb. nov., DV, MG; Schuh 1995: 630, catalogue; Schuh 2002-2013, online catalogue.

Discussion: *Papuacoris vittatus* (Reuter, 1908) was described on the female lectotype from Java alone. Carvalho (1985: 470) cites some additional specimens from Papua Barat and Papua New Guinea.

Hosts: unknown.

Note: This species was not recorded from Baiteta Forest.

Saturniomirini Carvalho, 1952

***Garainamiris* Carvalho, 1981b new tribal assignment**

References: *Garainamiris* Carvalho, 1981b: 479, as new genus; Schuh 1995: 627, catalogue; Schuh 2002-2013, online catalogue.

Type species: *Garainamiris antennatus* Carvalho, 1981b, by original designation and monotypy.

***Garainamiris antennatus* Carvalho, 1981b** (Figs 46-47, 53-59, plate 10 figs 1-2)

Additional material ISNB: Papua New Guinea: Madang: 6♂, 2♀: Baiteta, 05.v.1995, O. Missa leg., on *Tristiropsis acutangula* (Sapindaceae), fogging (FC n°s 4150-4156, 4159); 1♀: idem, 11.v.1995, O. Missa leg., host unknown, fogging (FC n° 4149); 1♂: idem, 17.vii.1995, O. Missa leg., on *Chisocheton welandia* (Meliaceae), fogging (FC n° 4160); 2♂: idem, 20.vii.1995, O. Missa leg., on *Celtis latifolia* (Ulmaceae), fogging (FC n°s 4157-4158).

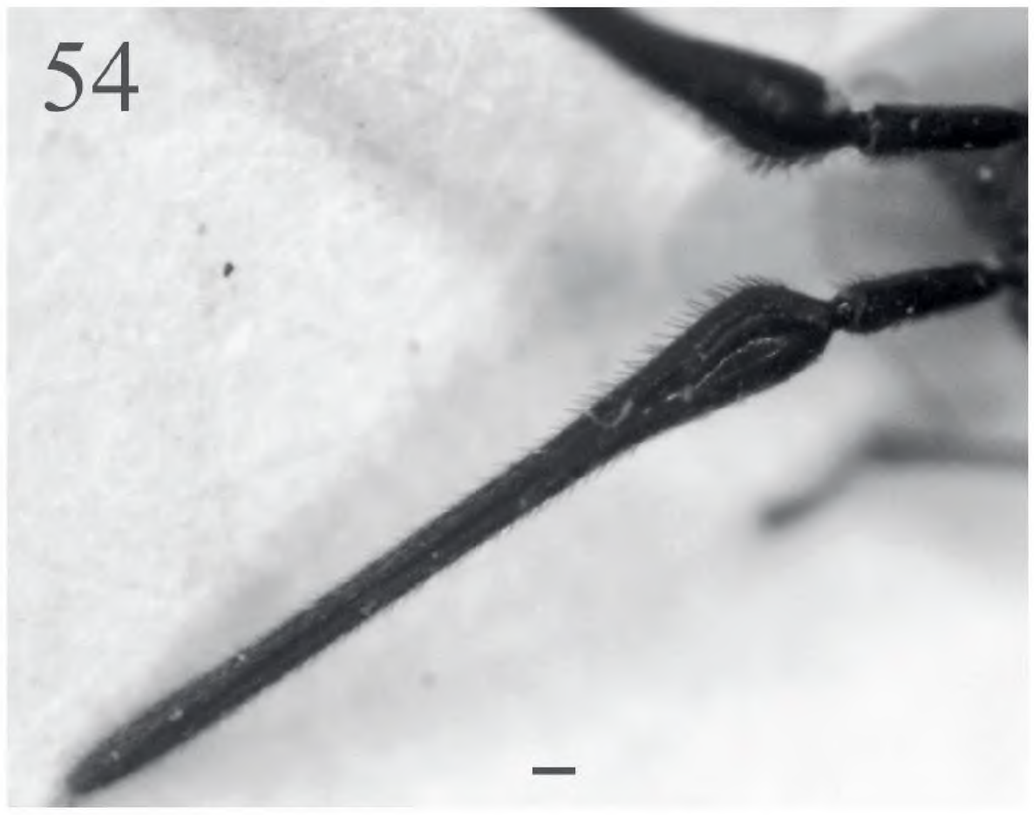
Other taxa examined for comparison (Plate 10 figs 3-12): *Cheesmaniella clavonigra* Carvalho, 1984b. Indonesia: Papua Barat: paratype 1♂ MNRJ: Swart Valley, Karubaka, 21.xi.1958 (FC n° 4212). *Cheesmaniella fasciata* Carvalho, 1984b. Indonesia: Papua Barat: paratype 1♀ MNRJ: Nete (= Netherlands), Vogelkop,

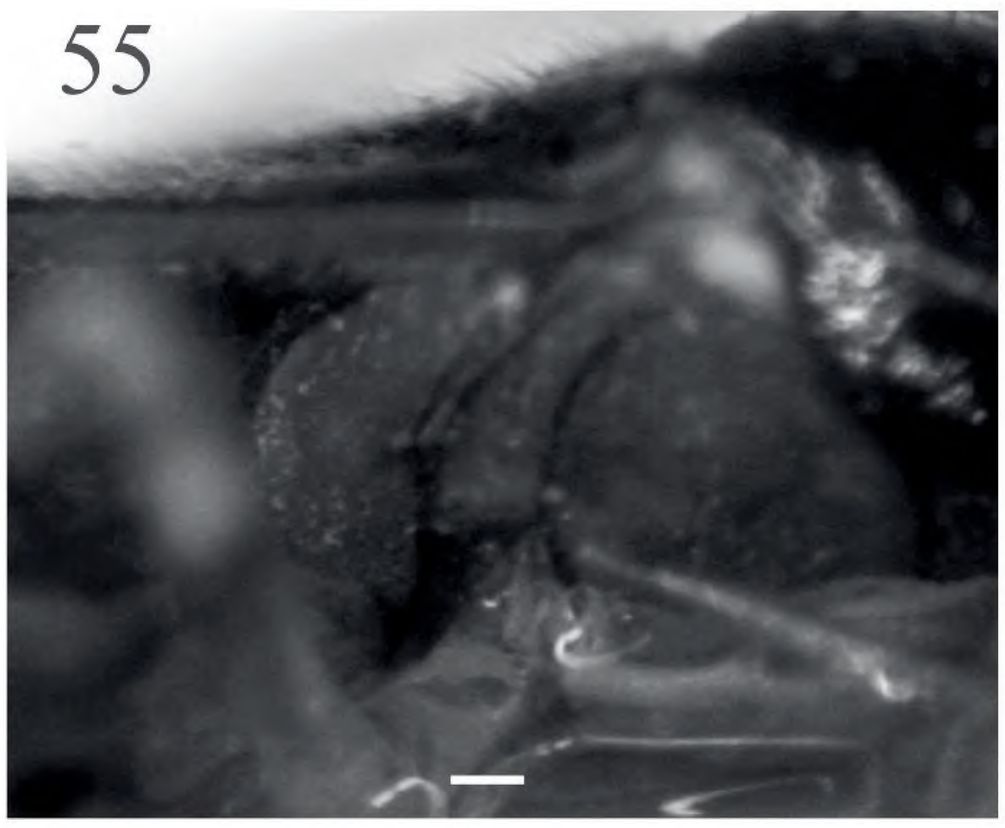


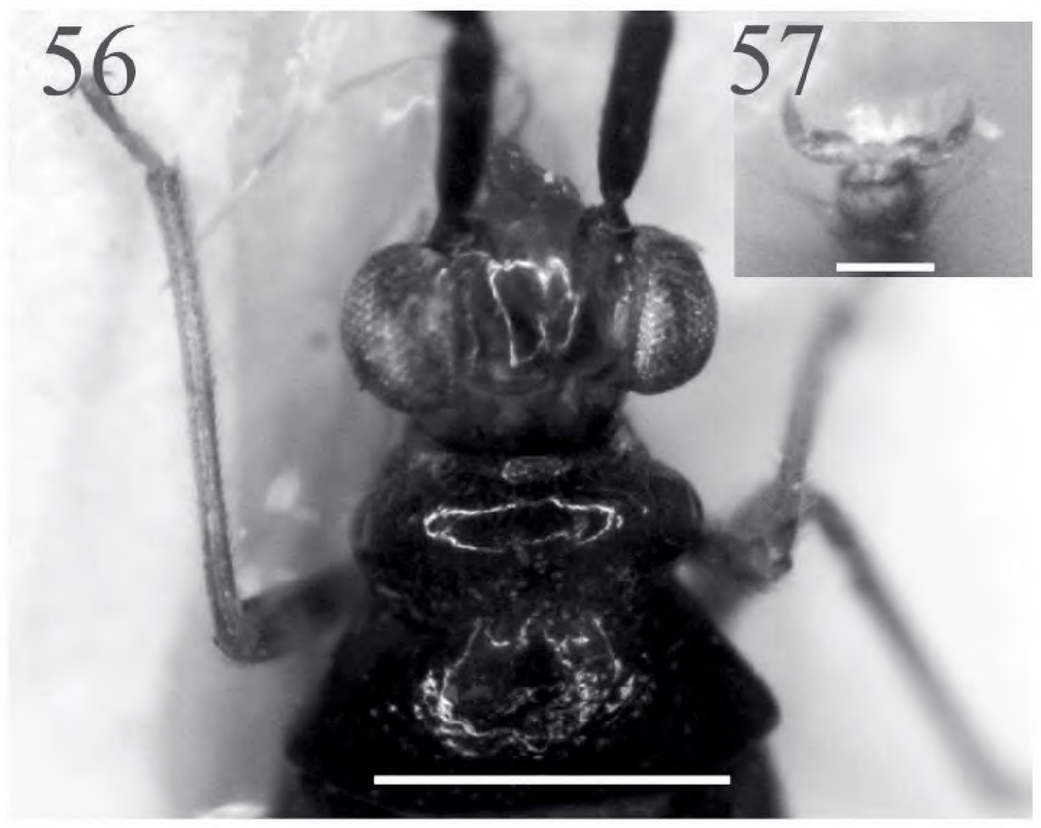


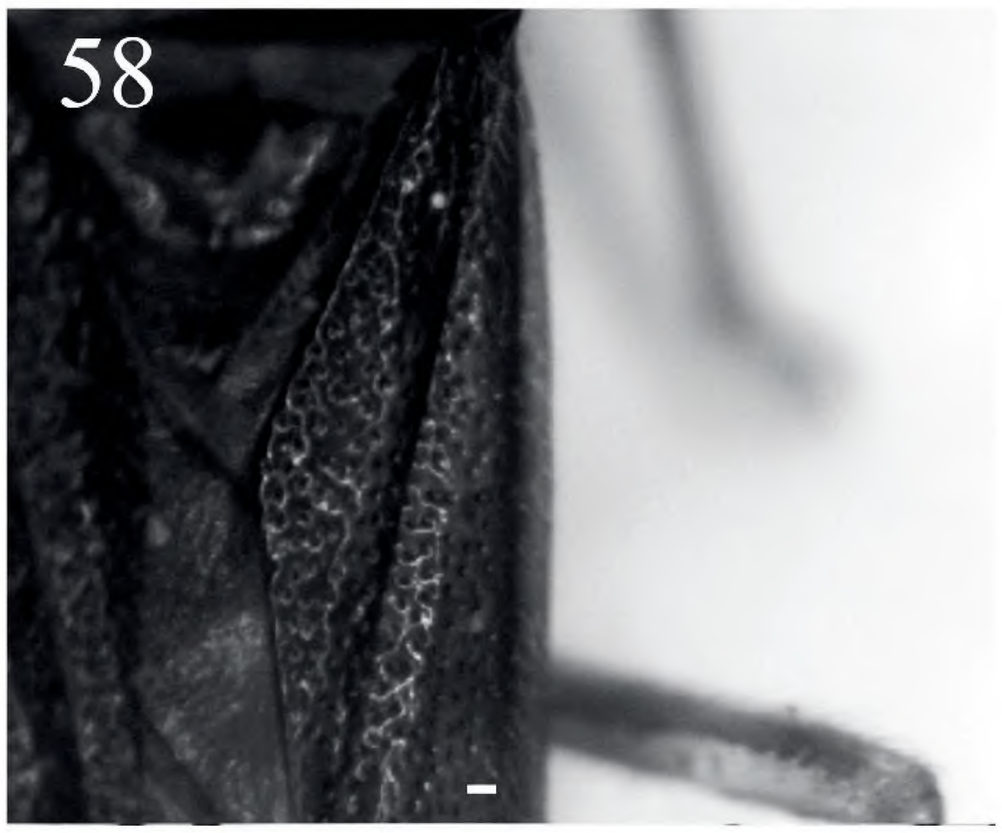

Boden (ou Bodem), 11km south-east of Oberfaren, 07-17.vii.1959, Maa T. C. leg. (FC n° 4211). *Cheesmaniella nigra* Carvalho, 1984b. Indonesia: Papua Barat: paratype 1♀ MNRJ: Nete (= Netherlands) Vogelkop, 11km south-east of Oberfaren, 08.vi.1959, Gressitt J. L. leg. (FC n° 4210). *Cheesmaniella notomaculata* Carvalho, 1984b. Indonesia: Papua Barat: Cendrawasih Peninsula: paratype 1♀ MNRJ: Kebar Valley, west of Manokwari, 04-31.i.1962, Quate L. W. leg. (FC n° 4209). *Imogen formosa* Kirkaldy, 1905. Papua New Guinea: New Britain: 1♀ MNRJ: Gazelle Pen., upper Warengui, Araburn, 28.xi.1962, Sedlacek J. leg. (FC n° 4206). Other *Imogen*

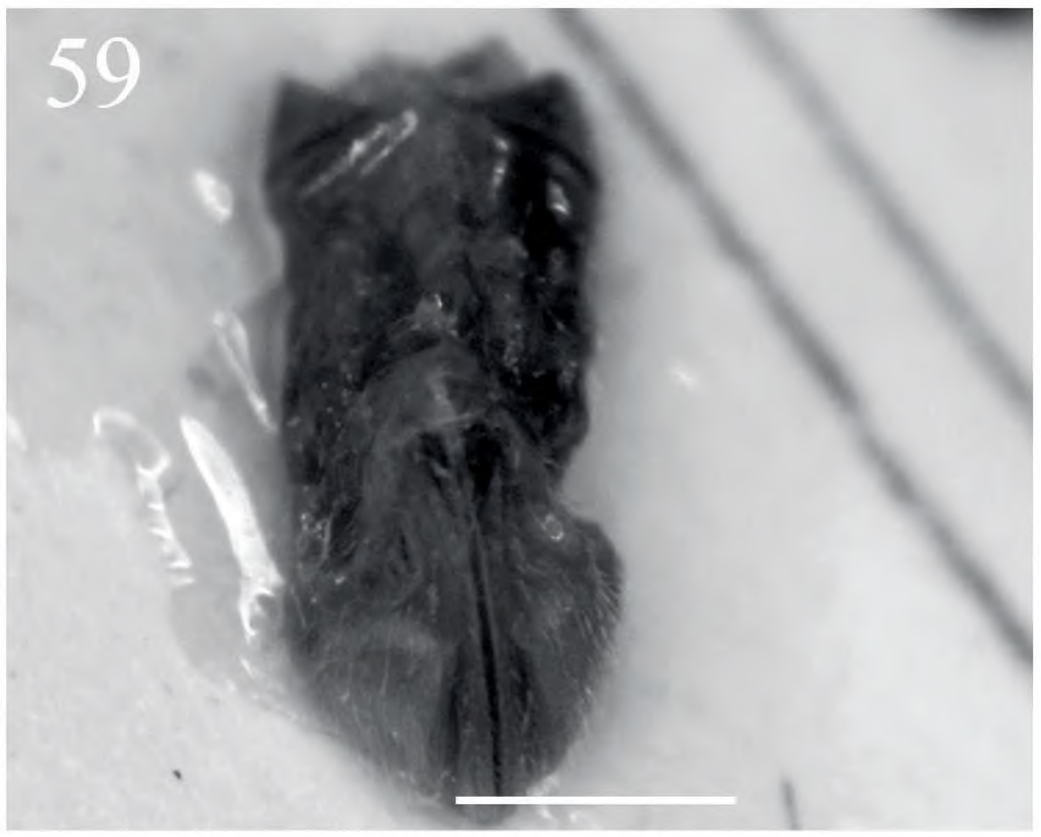












Figures 53-59. *Garainamiris antennatus* Carvalho, 1981b. 53 – Head, lateral view (FC n° 4154); 54 – Second antennal segment (FC n° 4154); 55 – Thorax, lateral view (FC n° 4158); 56 – Head and pronotal surface, dorsal view (FC n° 4154); 57 – Pretarsus and claw (FC n° 4154); 58 – Right clavus and corium (FC n° 4154); 59 – Abdomen, ventral view (female FC n° 4149) [scale bar 0.1 mm, except fig. 56 scale bar 1 mm].



species: cf. paragraphs about *I. bicolor* (Poppius, 1912), *I. fasciatus* Carvalho, 1983 and *I. papuensis* Carvalho, 1983 hereafter. *Saturniomiris lugens* (Walker, 1873b). Papua New Guinea: 1? BMNH syntype of *Capsus tristis* Walker, 1873): "[locality unknown] Saunders W. W. leg."; Western Province: 1? MNRJ: Kiunga (?), viii.1969, Sedlacek J. & M. leg.(FC n° 4208). *Synthlipsis annulipes* Carvalho, 1953. Australia: Queensland: 1? paratype MNRJ: Kuranda, vi.1904, Dodd F. P. leg. (FC n° 4213). *Synthlipsis ternatensis* (Distant, 1904). Indonesia: Ternate Island: syntype 1? BMNH: J. J. Walker leg. (FC n° 5353). *Trilaccus nigroruber* Horvàth, 1902. Australia: New South Wales: syntype 1♂ MNRJ: Richmond R. leg. (FC n° 5061) (HNHM); 1?: Norton's Bassin, Penrith, 13.vi.1918, Musgrave A. leg. (FC n°4214).

References: *Garainamiris antennatus* Carvalho, 1981b: 479, as new species; Schuh 1995: 627, catalogue; Schuh 2002-2013, online catalogue.

Addition to the original description: The genitalia of the female were still unknown. We take advantage of the numerous available specimens from Baiteta Forest to describe them. Parieto-vaginal rings (Fig. 46) elongate, anterior margin convex, posterior margin almost straight, latero-outer and latero-inner margins short, first convex, latter acute. In dorsal view, rings partially hidden by membranous dorsal wall (Dw) and lateral oviducts (LO). Dorsal labiates plate and seminal depository membranous. A sclerite S (Fig. 47) arises from the first (or eighth) valvifers (or gonocoxites). Posterior wall membranous.

Discussion: Carvalho (1981b: 479) described his new genus *Garainamiris* to accommodate his new species *G. antennatus* Carvalho, 1981 from Garaina, Papua New Guinea (Morobe Province), on the basis of the male holotype alone. The specimens from Baiteta Forest perfectly fit Carvalho's original description and drawings (Carvalho op. cit., p. 480, Figs 1-5). In his description, Carvalho (op. cit.: 479) points out the amazing shape of (male) second antennal segment, describing it as "characteristic, incrassate at base", but omitting to mention some other important character states of this segment. Strictly speaking, the second antennal segment is not "incrassate at base" but incrassate sub-basally, after a short cylindrical base. It is also sulcate almost on its entire length, from its swollen anterior part to its apex, the sulcus is curved, wide, relatively deep basally, straight, narrower and shallower medially and apically. The sulcate side of second antennal segment is flat in comparison of the convex other sides of the same segment. Both last antennal segments are classical, i.e. subcylindrical, yellow-brown, and narrower than the second to its apex.

The female is very similar to the male, but lighter particularly on the head, the pronotum and the hemelytra, with a second antennal segment subcylindrical, slightly thickened apically.

Amazingly, Carvalho (1981b: 479) originally classified his new genus in the tribe Deraeocorini and not in his tribe Saturniomirini Carvalho, 1952. Nevertheless, he compared *Garainamiris* only to *Synthlipsis* Kirkaldy, 1908b, a Saturniomirini, and *Garainamiris* possesses all character states cited by Carvalho (1952; 1955) and by Carvalho & Costa (1997) for the tribe Saturniomirini, i.e. the anterior part of pronotum strongly narrowed behind the callosities, the callosities large, wide, medially fused, covering the lateral margins of the pronotum, the eyes styled or substyled and the second cell of the membrane absent or very reduced. Moreover, *Garainamiris antennatus*, as *Imogen* Kirkaldy, 1905 – also a Saturniomirini – and *Synthlipsis* Kirkaldy, 1908b, has the pronotal callosities laterally prolonged in an ocellate or button-like structure.

Even if the tribal subdivisions of the subfamily Deraeocorinae are unsatisfactory (Cassis 1995; Cassis & Eyles 2006), if the tribal rank given to the Saturniomirini is impossible to confirm given the lack of a phylogeny of the subfamily and if the validity of several genera classified in Saturniomirini should be analysed (see Carvalho 1986b), the Saturniomirini seem to constitute a natural group of genera in the Deraeocorinae.

We consequently transfer *Garainamiris* Carvalho, 1981 from the Deraeocorini to Saturniomirini Carvalho, 1952 (new tribal assignment).

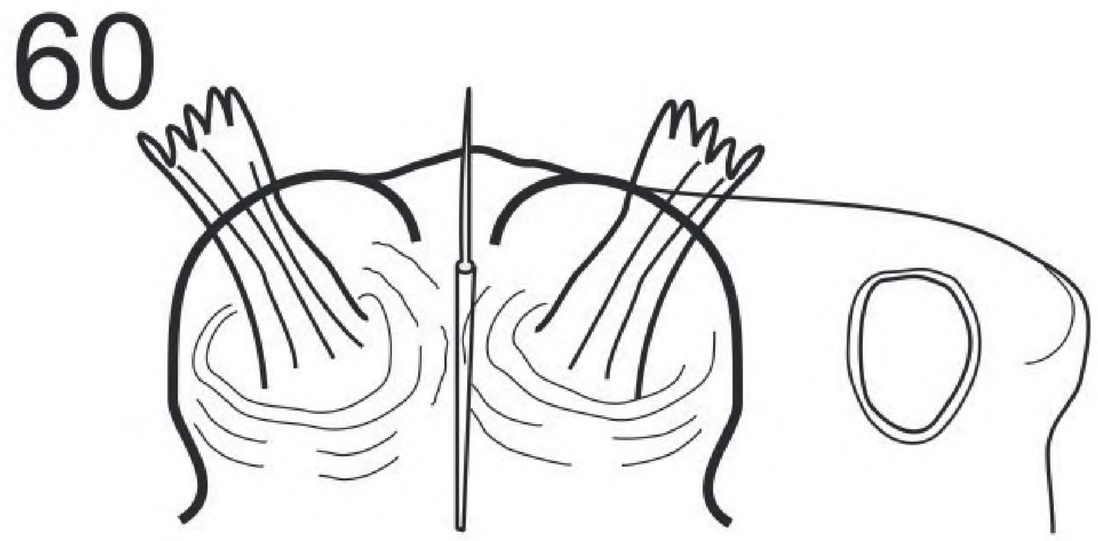
With the new assignment, the tribe Saturniomirini includes the 6 following genera:

Cheesmaniella Carvalho, 1984b
Garainamiris Carvalho, 1981
Imogen Kirkaldy, 1905
Saturniomiris Kirkaldy, 1902a
Synthlipsis Kirkaldy, 1908b
Trilaccus Horvàth, 1902

Garainamiris Carvalho, 1981 is easily separated from *Cheesmaniella* Carvalho, 1984b and from *Saturniomiris* Kirkaldy, 1902a by the pronotal punctation. The pronotal punctation of *Saturniomiris lugens* is very dense, relatively narrow and deep, the pronotal punctation of the four *Cheesmaniella*'s species is sparser, wider and also relatively deep whereas the pronotal punctation of *Garainamiris antennatus* is sparse, wide and shallow, the pronotum seeming almost





Figures 60-61. *Imogen fasciatus* Carvalho, 1983 and *I. papuensis* Carvalho, 1983, female genitalia. Parieto-vaginal rings of *I. fasciatus* (Fig. 60) and *I. papuensis* (Fig. 61) respectively [scale bar 0.1 mm].

unpunctate in dorsal view at low magnification. *Garainamiris antennatus* can be also easily separated from the Papuan *Imogen* Kirkaldy, 1905 by its elongate body shape (the *Imogen* species are rounded, their exocoria being convex). The genus is more similar to *Synthlipsis* Kirkaldy, 1908b and *Trilaccus* Horvàth, 1902 by the habitus. However, the dorsal punctation of *Trilaccus* Horvàth, 1902, particularly its hemelytral punctation, seems more reduced. Finally, *Garainamiris* is the sole genus of Saturniomirini with such extraordinary sexual dimorphism of second antennal segment.

Hosts: In Baiteta Forest, *Garainamiris antennatus* Carvalho, 1981b was recorded by fogging, in four independent collection events, on three different identified host plants: *Celtis latifolia* (Ulmaceae), *Chisocheton welandia* (Meliaceae) and *Tristiropsis acutangula* (Sapindaceae). Apparently, the species was not cited in the literature since its description and its biology was totally unknown.

***Imogen* Kirkaldy, 1905**

References: *Imogen* Kirkaldy, 1905: 337, as new genus; Schuh 1995: 648, catalogue; Schuh 2002-2013, online catalogue.

Type species: *Imogen formosa* Kirkaldy, 1905 by monotypy.

***Imogen bicolor* (Poppius, 1912b)** (Plate 10 fig. 7)

Additional material: Papua New Guinea: Madang: 1♂ ISNB: Baiteta, 02.viii.1995, O. Missa leg., on *Dysoxylum patigravianum* (Meliaceae), fogging (FC n° 4146); Wau: 1? MNRJ: Wau, 30.vi.1965, Sedlacek J. leg. (FC n°4205) (compared with the type by J.C.M. Carvalho).

References: *Araspus bicolor* Poppius, 1912b: 227, as new species. *Imogen bicolor*: Akingbohungbe 1978: 89, redescription, new combination; Carvalho 1983: 401-402, redescription, new combination, DV, MG; Schuh 1995: 648, catalogue; Schuh 2002-2013, online catalogue.

Discussion: *Imogen bicolor* (Poppius, 1912b) was described on a small series of male specimens from Ighibirei, Central Province, Papua New Guinea. Carvalho (1983: 402) cites additional specimens from Papua Barat, Indonesia and from Papua New Guinea.

Hosts: In Baiteta Forest, *Imogen bicolor* (Poppius, 1912b) was recorded only one time, by fogging, on *Dysoxylum patigravianum* (Meliaceae).

***Imogen fasciatus* Carvalho, 1983** (Fig. 60, plate 10 fig. 8)

Holotype ♀ USNM: Papua New Guinea: Morobe: "Finschhafen, 04.v.1944, Ross E. S." (FC n° 5250).

Paratype ♀ MNRJ: Central Province: Owen Stanley Range, Golalai, Tapini, 16-25.xi.1957, Brandt W. W. leg. (FC n°4207).



Additional material 1♀ ISNB: Papua New Guinea: Madang: Baiteta, 1995, O. Missa leg., host and collecting method unknown (FC n° 4144).

References: *Imogen fasciatus* Carvalho, 1983: 402-403, as new species, DV; Schuh 1995: 648, catalogue; Schuh 2002-2013, online catalogue.
Addition to the original description: The genitalia of both sexes were unknown still, the male sex remaining totally unknown. We take advantage of the available specimens to provide hereafter a first description of the female genitalia: Parieto-vaginal rings (Fig. 60) large, anterior margin straight, posterior, latero-outer and latero-inner margins convex. Dorsal wall membranous, partially hidden rings in dorsal view, lateral oviducts wide, and "worm-like" or spermathecal gland elongate. Seminal depository and posterior wall membranous.
Discussion: *Imogen fasciatus* Carvalho, 1983 was described on five female specimens, the holotype from Finschafen (Morobe, Papua New Guinea) and four paratypes, three from Papua New Guinea (Central Province, Eastern Highlands and Wau respectively) and one from Papua Barat. Its biology – including host plant – is totally unknown.

***Imogen papuensis* Carvalho, 1983** (Fig. 61, plate 10 fig. 10)
Holotype ♀ USNM: Papua New Guinea: Northern: "M(oun)t Lamington Province, C. T. McNamara coll." (FC n° 5221).
Paratype ♀ MNRJ: Kokoda Pitoki, 24.iii.1956, Gressitt J. L. leg. (FC n°4204).
Additional material 1♀ ISNB: Papua New Guinea: Madang: Baiteta, 05.v.1995, O. Missa leg., on *Tristiropsis acutangula* (Sapindaceae), fogging (FC n° 4145).

References: *Imogen papuensis* Carvalho, 1983: 403-404 (as new species, DV); Schuh 1995: 648, catalogue; Schuh 2002-2013, online catalogue.
Addition to the original description: The genitalia of both sexes were unknown still. We take advantage of the available specimens to provide hereafter a first description of the female genitalia: Parieto-vaginal rings (Fig. 61) reduced, obviously separated, elongate, with margins slightly convex. Dorsal wall and posterior wall membranous, lateral oviducts wide.
Discussion: *Imogen papuensis* Carvalho, 1983 was described on nine specimens of both sexes, the female holotype from Mt. Lamington (northern Papua New Guinea) and eight paratypes, seven from Papua New Guinea (Morobe, Northern and Wau respectively) and one from Papua Barat. Its biology was totally unknown. In Baiteta Forest, *I. papuensis* was recorded only one time by fogging from *Tristiropsis acutangula* (Sapindaceae).

Mirinae Hahn, 1833
Hyalopeplini Carvalho, 1952

In his unpublished PhD thesis, Chérot (2002) suggested the name of family group and of tribal rank Hyalopeplini Carvalho, 1952 could be treated as junior subjective synonym of the name Mirini Hahn, 1833 [6]. The genera and species classically included in the nominal tribe Hyalopeplini are apparently devoid of diagnostic and potentially synapomorphic character state. In other words, they lack common character states absent in other Mirinae. As a consequence of this absence, they were included in a large group of Mirinae genera (the Mirini sensu lato i.e. Mirini + Hyalopeplini sensu auct.) and do not constitute a monophyletic group in it. Alone the set Mirini + Hyalopeplini sensu auct is monophyletic in preliminary cladistic analyses. Because a new classification of the Mirinae genera was not yet published (Chérot – op. cit. – including a disclaiming of nomenclatural purpose of all nomenclatural acts he suggested, according to Article 8.3 of the International Code of Zoological Nomenclature, Fourth edition) and because this issue is beyond the scope of this paper, we adopt here the classical tribal classification of subfamily, even if it is now challenged.

Guisardinus Carvalho in Carvalho et Gross, 1979
References: *Guisardinus* Carvalho in Carvalho et Gross, 1979: 441-443, as new genus: description, key, new species; Schuh 1995: 676, catalogue; Schwartz & Chérot 2005: 7-8, discussion; Schuh 2002-2013, online catalogue.
Type species: *Guisardinus neoguineanus* Carvalho in Carvalho et Gross, 1979, by original designation.

***Guisardinus neoguineanus* Carvalho in Carvalho et Gross, 1979** (Figs 62-68, plate 11 fig. 1)
Additional material 1♀ ISNB: Papua New Guinea: Madang: Baiteta, 26.v.1995, O. Missa leg., on *Terminalia sepikana* or *Piteleocarpus indicum* (Combretaceae and Fabaceae respectively), fogging (FC n° 3853).
Other taxa examined for comparison: *Guisardinus lineatus* Carvalho in Carvalho & Gross, 1979: China: paratype ♀ BMNH: "BMNH" / "*Guisardinus lineatus* sp. nov." / "Paratipo" / "British Museum 1964-26" (verso) / "*L. Gressitt* coll." / "Ta Han, Hainan I(slan) d, 06.vii.1933" (FC n° 977); 1♀ CFC: Thailand: Bangkok,

6 Chérot's (2002) PhD conclusions about Hyalopeplini were summarised in Chérot (2013).






10.v.1974, leg. E. Heiss (FC n° 1089).

References: *Guisardinus neoguineanus* Carvalho in Carvalho et Gross, 1979: 442, as new species; Schuh 1995: 676, catalogue; Schuh 2002-2013, online catalogue.

Redescription: Body elongate, wide, total length: 6.3, maximal width of hemelytra (after middle of hemelytra): 2.51, yellow-brown with red-brown stripes, hemelytra glossy, yellow-brown. Head. Clypeus partially covered by frons in dorsal view, yellow brown, with short and erect setae. Maxillary and mandibular plates uncarinate, lacking tubercle, yellow brown, mandibular plates elongate and narrow (Fig. 62). Frons slightly rounded, laterally striate, yellow-brown to green-grayish, with very short, recumbent or suberect, white setae, without sericeous or woolly setae. Eyes glabrous, substylate, silvery, occupying about 50 percent of height of head in lateral view. Total width of diatone: 1.30, width of vertex: 0.55. Vertex uncarinate, slightly sulcate medially. Antenna elongate. First segment yellow-brown, widened and club-shaped subbasally, narrowed medially. Second, third and fourth segments narrower, second red-brown, third and fourth almost black. Lengths of joints: 0.87, 1.90, 1.42, 0.40. Labium yellow, short, extending slightly beyond mesocoxa; apex black. Thorax. Pronotum (Fig. 64). Total length (collar included): 1.54, posterior width: 2.1. Collar large (medial length: 0.33), obviously striate, orange brown, with a medial red-brown to black stripe. Callosities rounded, yellow brown, separated medially and from the lateral margins of disk. Pronotal disk almost glabrous, setae very short, suberect. Pronotal surface yellow brown with pair of dark brown to black spots on posterior margin, a very narrow medial red-brown stripe and two red-brown to dark-brown spots on swollen humeral angles. Punctation wide and deep. Metastethium (Fig. 63). Mesoscutum totally covered. Scutellum (Figs 64, 67). Length: 0.83, basal width: 0.95. Yellow, pilosity white, suberect, punctation wide and deep, except apex smooth, the lateral margins crenulate. Legs (Fig. 65). Femora yellow-brown, with red-brown patches and brownish, elongate, suberect setae. Metafemora with suberect, yellowish setae, two rows of black spinulae and white to yellowish spines. First segment of tarsi yellow, second and third segments darker, second red-brown, third almost black apically. Claws (Fig. 66). Hemelytra (Fig. 67). Clavus basally opaque, apically slightly translucent, inner margin black, surface orange to yellow-brown, with numerous shallow and narrow punctation and row of deep and wide punctures along clavo-corial suture. Claval vein yellow. Pilosity erect, white, without sericeous or woolly setae. Corium translucent to glassy, orange to yellow-brown, the corial vein brown, inner margin red-brown to black. A row of deep and relatively wide red-brown punctures in middle of exocorium, surface of corium with numerous very small, narrow and shallow punctation. Cuneus translucent, orange to yellow-brown, apex with brown patch. Length of cuneus: 0.86, width of cuneus: 0.39. Membrane glassy, yellowish, veins yellow to brown. Abdomen (Fig. 68): yellowish to gray-green, with long white setae.

Discussion: *Guisardinus neoguineanus* Carvalho in Carvalho & Gross, 1979 was known only by the female holotype from Elipatim Valley, Northern Province, Papua New Guinea. Our specimen perfectly fits with Carvalho's brief description. The bug is *Guisardus*-like, with a pair of substyled eyes, a striate pronotal collar, a strongly punctate pronotum, the punctation wide and deep, a pair of globose humeral angles and a punctate scutellum. Consequently, it can effectively be classified in the genus *Guisardinus* Carvalho in Carvalho & Gross, 1979. The colouration – particularly the infuscated base of clavus and the dark spots of pronotum –, mensurations[7] and body shape - with the hemelytra slightly widened posteriorly – fit well the species *G. neoguineanus*. We take advantage of our additional specimens to provide hereabove a redescription of this still poorly known species. *Guisardinus neoguineanus* Carvalho in Carvalho & Gross, 1979 can easily be separated from *G. lineatus* (Carvalho in Carvalho & Gross, 1979), the other *Guisardinus* species present in New Guinea (the holotype of *G. lineatus* was found in Papua Barat, Muffin Bay). The hemelytra are widened posteriorly and lack a transverse fascia on the corium at level of clavus apex in *G. neoguineanus*; the lateral margins of hemelytra are almost straight and the transverse fasciae obvious in *G. lineatus*.

Hosts: In Baiteta Forest, *G. neoguineanus* was recorded only once, by fogging, on *Terminalia sepikana* (Combretaceae) or *Piteleocarpus indicum* (Fabaceae).

Guisardus Distant, 1904c

References: *Guisardus* Distant, 1904c: 436, as new genus; Carvalho & Gross 1979: 444-451, redescription, key, new species; Schuh 1995: 676, catalogue; Kerzhner & Josifov 1999: 203,

7 The cuneus length (0.08 mm) given by Carvalho & Gross (1979: 442) is obviously wrong.

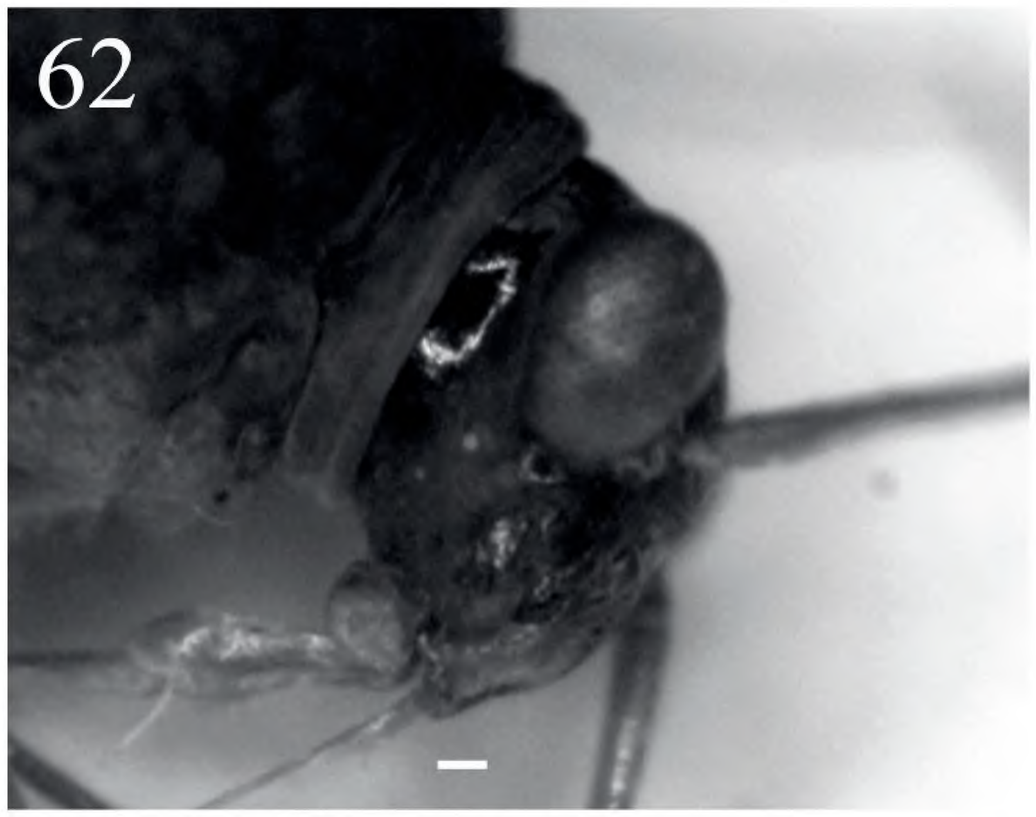


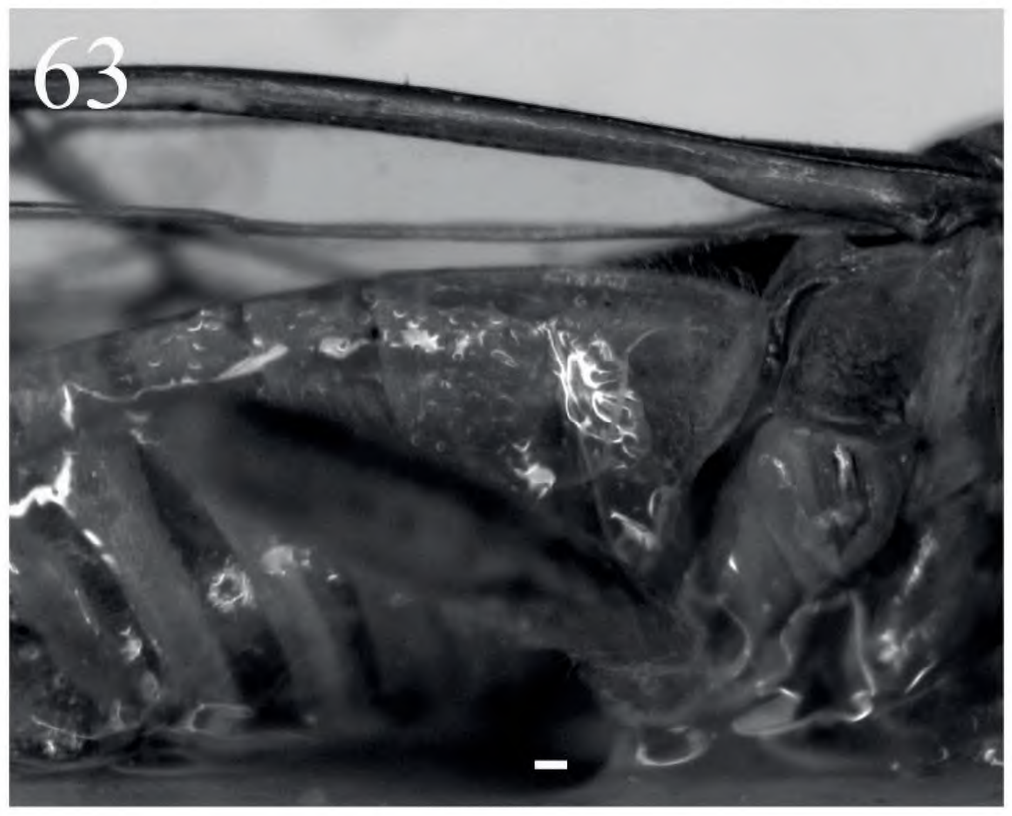


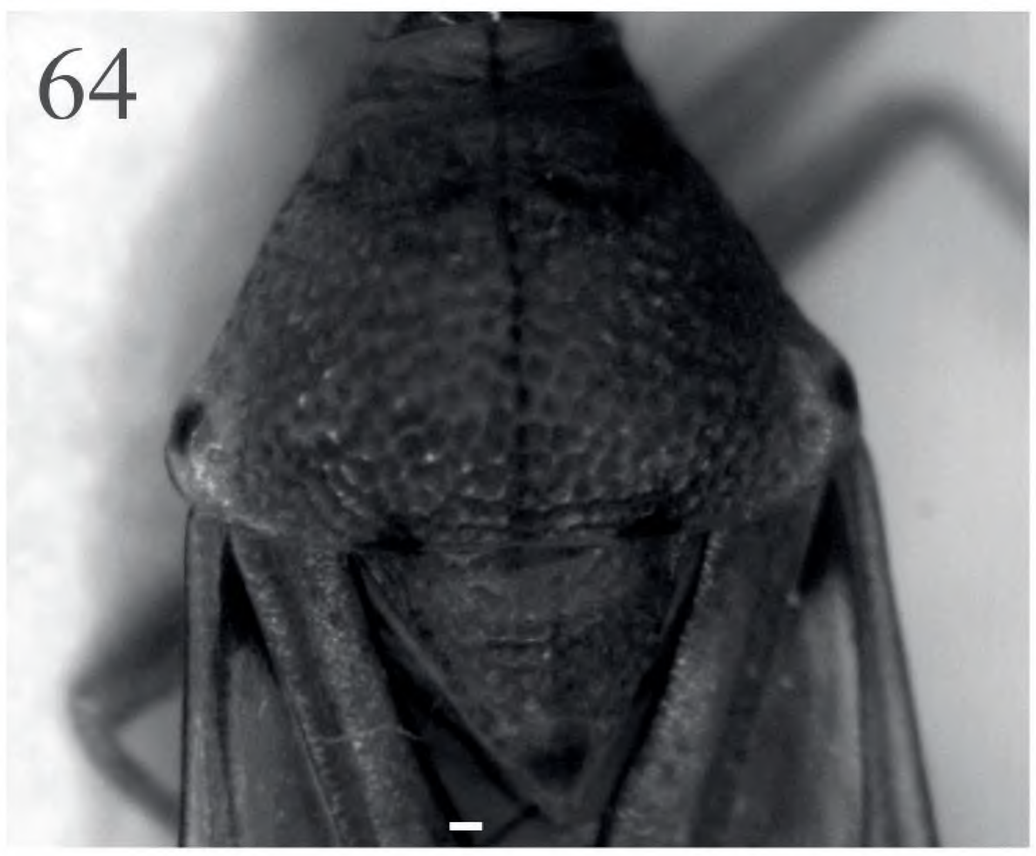
catalogue; Schuh 2002-2013, online catalogue.
Type species: *Guisardus pellucidus* Distant, 1904c, by monotypy.

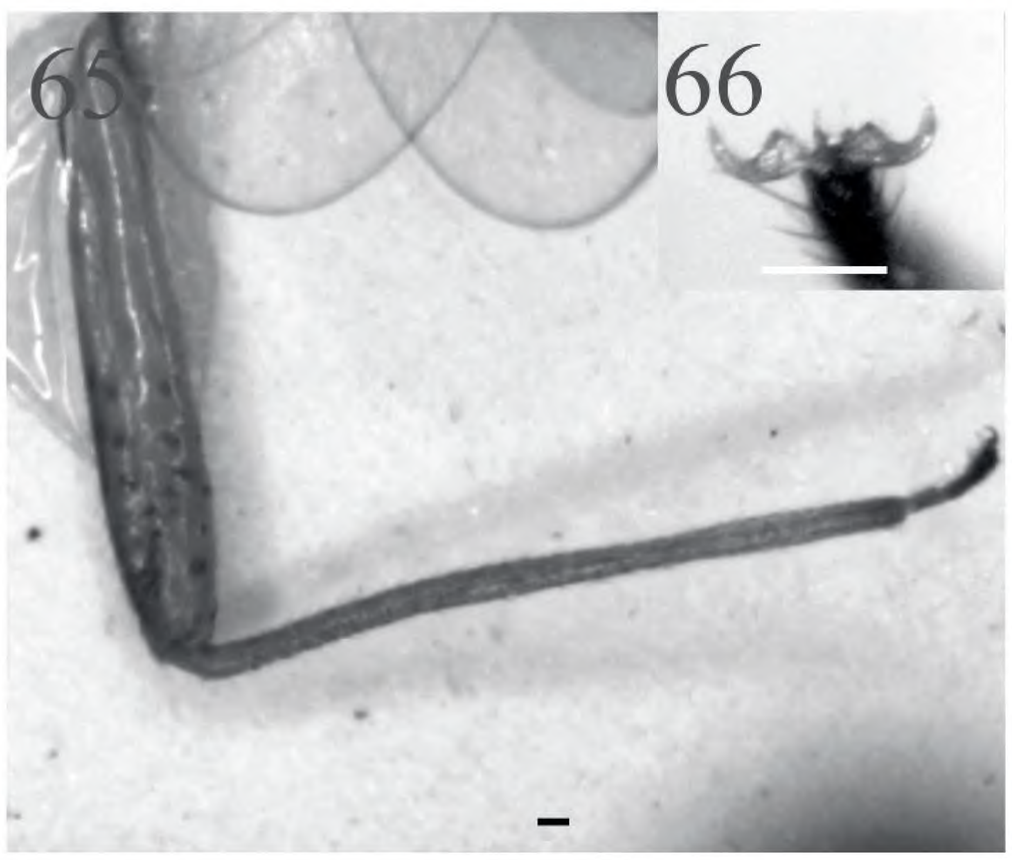
***Guisardus strigicollis* Poppius, 1912a** (Plate 11 fig. 2, plate 12 figs 1-6)

Additional material ISNB: Papua New Guinea: Madang: 1♂: Baiteta, 16.iii.1993, O. Missa leg., on *Dracontomelum dao* (Anacardiaceae), light (FC n°3980); 1♂: *idem*, 12.v.1993, O. Missa leg., on *Dracontomelum dao* (Anacardiaceae), fogging (FC n°1344); 2♂, 1♀: *idem*, 20.v.1993, O. Missa leg., on *Pomatia pinnata*

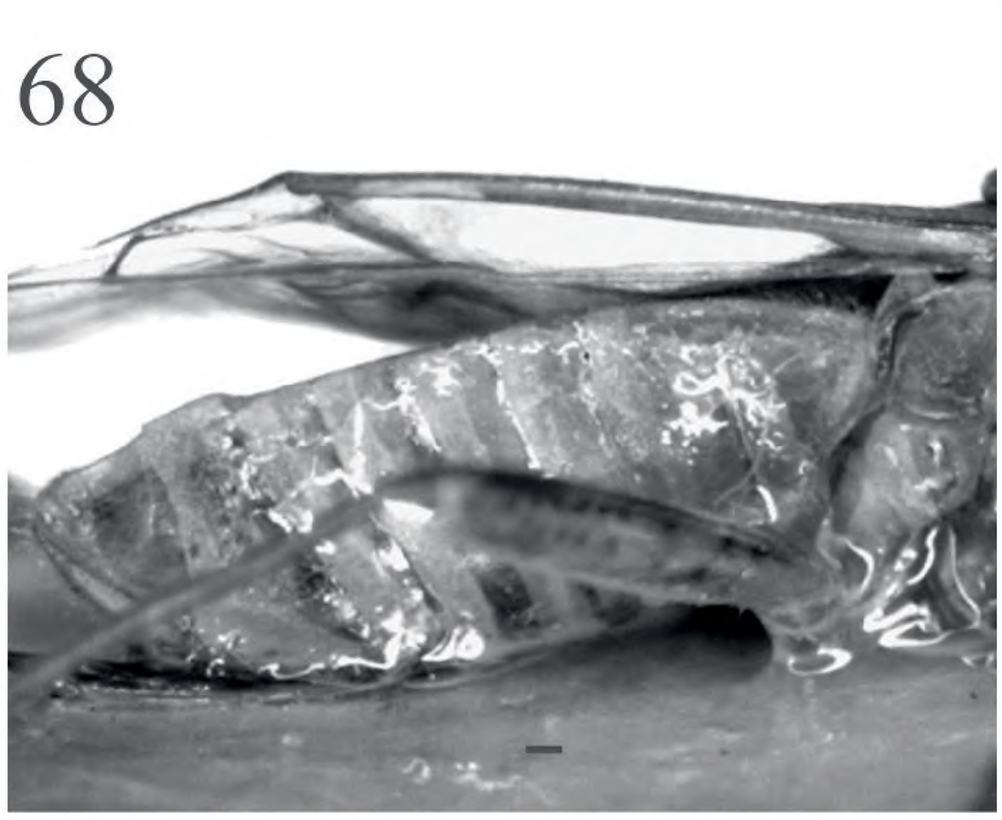












Figures 62-68. *Guisardinus neoguineanus* Carvalho in Carvalho et Gross, 1979 (FC n° 3853). 62 – Head, lateral view; 63 – Metapleura; 64 – Pronotal surface; 65 – Hind leg; 66 – Pretarsus and claw; 67 – Clavus; 68 – Abdomen, lateral view [scale bar 0.1 mm].









(Sapindaceae), fogging (FC n°s 3974-3976); 6♀: *idem*, 22.vi.1993, O. Missa leg., on *Dracontomelum dao* (Anacardiaceae), fogging (FC n°s 1338-1343, 3835); 4♂, 2♀: *idem*, 05.v.1995, O. Missa leg., on *Tristiropsis acutangula* (Sapindaceae), fogging (FC n°s 3874-3879); 6♂, 6♀: *idem*, 11.v.1995, O. Missa leg., on ?, fogging (FC n°s 3960-3971); 1♂: *idem*, 24.v.1995, O. Missa leg., on *Buchanania heterophylla* (Anacardiaceae) or *Hernandia ovigera* (Hernandiaceae) or *Vitex cofassus* (Verbanaceae), fogging (FC n° 3982); 10♂, 8♀: *idem*, 06.vi.1995, O. Missa leg., on *Chisocheton ceramicus* (Meliaceae), light trap (FC n°s 3914-3931); 1♀: *idem*, 06.vi.1995, O. Missa leg., on *Celtis philippinensis* (Ulmaceae), fogging (FC n° 3886); 1?: *idem*, 30.vi.1995, O. Missa leg., on *Ficus* sp.(Moraceae), fogging (FC n°3984); 1♂, 1♀: *idem*, 08.iv.1996, O. Missa leg., on *Chisocheton ceramicus* (Meliaceae), light trap (FC n°s 3935-3936); 2♂, 2♀: *idem*, 09.iv.1996, O. Missa leg., on *Dysoxylum arnoldianum* or *Homalium foetidum* (Meliaceae and Flacourtiaceae), light trap (FC n°s 3880-3883); 2♂, 1♀: *idem*, 12.iv.1996, O. Missa leg., on ?, fogging (FC n°s 3951, 3972-3973); 1♂: *idem*, 17.iv.1996, O. Missa leg., on ?, fogging (FC n°s 3979); 1♂: *idem*, 24.iv.1996, O. Missa leg., on *Chisocheton ceramicus* (Meliaceae), fogging (FC n°s 3934a); 1♂, 2♀: *idem*, ?.iv.1996, O. Missa leg., on ?, light trap (FC n°s 3937-3939); 1♂: *idem*, 1.v.1996, O. Missa leg., on ?, fogging (FC n°s 3983); 6♂, 6♀: *idem*, 27.v.1996, O. Missa leg., on ?, fogging (FC n°s 3948-3950, 3952-3959, 3977); 1♂ & 1♀: *idem*, 03.vi.1996, O. Missa leg., on *Celtis philippinensis* (Ulmaceae), light trap (FC n°s 3932-3933); 1♀: *idem*, 04.vi.1996, O. Missa leg., on *Buchanania heterophylla* (Anacardiaceae) or *Hernandia ovigera* (Hernandiaceae) or *Vitex cofassus* (Verbanaceae), light trap (FC n° 3873); 1♀: *idem*, 05.vi.1996, O. Missa leg., on *Buchanania heterophylla* (Anacardiaceae) or *Hernandia ovigera* (Hernandiaceae) or *Vitex cofassus* (Verbanaceae), light trap (FC n° 3872); 2♀: *idem*, 05.vi.1996, O. Missa leg., on *Celtis philippinensis* (Ulmaceae), light trap (FC n°s 3940-3941); 3♂, 2♀: *idem*, 10.vi.1996, O. Missa leg., on *Buchanania heterophylla* (Anacardiaceae) or *Hernandia ovigera* (Hernandiaceae) or *Vitex cofassus* (Verbanaceae), light trap (FC n°s 3867-3871); 3♂, 4♀: *idem*, 18.vi.1996, O. Missa leg., on ?, light trap (FC n°s 3942-3947); 1♂, 1♀: *idem*, 26.vi.1996, O. Missa leg., on *Terminalia sepikana* or *Piteleocarpus indicum* (Combretaceae and Fabaceae respectively), fogging (FC n°s 3884-3885); 1♀: *idem*, 27.vi.1996, O. Missa leg., host unknown, fogging (FC n° 3978); 1♀: *idem*, 03.vii.1996, O. Missa leg., on ?, fogging (FC n° 3981).

References: *Serropeltis strigicollis* Poppius, 1912a: 426-427, as new species; *Guisardus strigicollis* Carvalho & Gross 1979: 450-451, redescription, MG; Schuh 1995: 676, catalogue; Chérot 2002: 198, 205, 210, SEM, misidentified as *Guisardus* sp. cf. *bogorensis* Carvalho in Carvalho et Gross, 1979; Schuh 2002-2013, online catalogue.

Discussion: Carvalho & Gross (1979: 444) separate the *Guisardus* species mainly on colouration character states. The majority of our specimens conform to their description of *G. strigicollis* (Plate 11 fig. 2 and plate 12 fig. 1). However, in the Baiteta Forest specimens, the clavus is generally dark (Plate 12 figs 1-2) but not always totally black (Plate 12 figs 4-5), the dark pronotal spots are sometimes almost erased (Plate 12 fig. 3) and the scutellum is sometimes darkly puncturated (Plate 12 fig. 4, arrows). Such dark punctures on the scutellum would be a characteristic of *G. cristovalensis* Carvalho in Carvalho & Gross, 1979 according to Carvalho & Gross' key even if the specimen of *G. strigicollis* pictured in their Fig. 45, p. 451 possesses four dark punctures and if the punctures of some Baiteta Forest's specimens are clear (Plate 12 fig. 5) or absent. Some other specimens look similar to *G. chinensis* Carvalho in Carvalho & Gross, 1979 by their pronotal and scutellar colouration (Plate 12 fig. 2), but their head is totally dark brown to black and their second antennal segment largely dark. We interpret this as intraspecific variability and we suggest the validity of the species *G. chinensis*, *G. bogorensis* and *G. cristovalensis* should be carefully reexamined.
G. strigicollis (Poppius, 1912a) was described only on the holotype female from Indonesia, Mentawai (= Mentawei) Archipelago, Sipura (= Sipora) Island, Sereinu. Carvalho & Gross (1979: 451) cite additional specimens from Papua Barat and Papua New Guinea.
Hosts: In Baiteta Forest, hundred specimens were recorded, in 27 independent collection events, by light traps and by fogging, from *Celtis philippinensis* (Ulmaceae), *Chisocheton ceramicus* (Meliaceae), *Dracontomelum dao* (Anacardiaceae), *Ficus* sp. (Moraceae), *Pometia pinnata* (Sapindaceae), *Tristiropsis acutangula* (Sapindaceae) and several unidentified (other) plants.

Hyalopeplinus Carvalho in Carvalho et Gross, 1979

References: *Hyalopeplinus* Carvalho in Carvalho et Gross, 1979: 451, as new genus; Schuh 1995: 676-677, catalogue; Schuh 2002-2013, online catalogue.
Type species: *Callicratides antennalis* Distant, 1920, original designation.






***Hyalopeplinus papuensis* Carvalho in Carvalho et Gross, 1979** (Plate 11 fig. 3)

Paratype ♀ BMNH: Papua New Guinea: Northern: "Gulariu River, Biniguni, 14.vii to 14.viii.1953, Tate M. G. leg." (FC n° NE208).

Additional material 7♂ & 4♀ ISNB: Papua New Guinea: Madang: Baiteta, 03.viii.1995, O. Missa leg., *Neonauclea* sp. (Rubiaceae), fogging (FC n°s 3831-3832, 3839-3841, 3887-3892).

References: *Hyalopeplinus papuensis* Carvalho in Carvalho et Gross, 1979: 458-459, as new species, male genitalia; Schuh 1995: 677, catalogue; Schuh 2002-2013, online catalogue.

Discussion: *Hyalopeplinus papuensis* Carvalho in Carvalho et Gross, 1979 was described using eight specimens, one from Indonesia, Papua Barat (the male paratype from Warris) and seven from Papua New Guinea. The specimens from Papua New Guinea were recorded on different islands (the male holotype and two paratypes of the same sex on Rossel Island, Louisiade Archipelago, Milne Bay Province, a female paratype on Sudest Island, Louisiade Archipelago, Milne Bay Province and another female from west of Willaumes, West New Britain Province, New Britain) but also on the mainland (the female paratype from Biniguni, Northern Province and a male paratype from Ruka, Northern Province).

Hosts: In Baiteta Forest, eleven specimens were recorded by fogging in a unique collection event on *Neonauclea* sp.

***Hyalopeploides* Poppius, 1912a**

References: *Hyalopeploides* Poppius, 1912a: 419-420, as new genus; Carvalho & Gross 1979: 463-476, 477; Schuh 1995: 677-678, catalogue; Schuh 2002-2013, online catalogue.

Type species by original designation and monotypy: *Hyalopeploides cyanescens* Poppius, 1912.

***Hyalopeploides cyanescens* Poppius, 1912a** (Plate 11 fig. 4)

Paralectotype ♂ ZMHF, designation by Carvalho in Carvalho & Gross, 1979: 467: Papua New Guinea: Morobe: "*Hyalopeploides cyanescens* Popp. Det. J.C.M. Carvalho" / "Mus. Zool. Helsfors loan 2973" / "Mus. Zool. H:fors Spec. typ. N°9877 *Hyalopeploides cyanescens* Popp." / "*Hyalopeploides cyanescens* gen. nov. et sp." / "Lemien, Berlinhafen" / "N. Guinea, Biró" (FC n° 4935).

Additional material ISNB: Papua New Guinea: Madang: 1♂: Sisimangun Village, 01.vii.1981, Leg. J. Van Goethem (FC n° 349); 1♂: *idem*, Baiteta, 14.vii.1995, O. Missa leg., on *Neonauclea* sp. (Rubiaceae), fogging (FC n° 3893); 1♀: Mandy Passage St. 1030, 04.v.1982, P. Grootaert (FC n° 351); Morobe: 1♀: Wau, vi.1981, 1220m., Leg. J. Van Goethem (FC n° 350).

References: *Hyalopeploides cyanescens* Poppius, 1912a: 421, as new species; Carvalho & Gross 1979: 467, 468 (redescription); Schuh 1995: 677-678, catalogue; Schuh 2002-2013, online catalogue.

Discussion: *Hyalopeploides cyanescens* Poppius, 1912 was described using three specimens from Papua New Guinea: the female lectotype from Erima, Astrolabe Bay, Madang Province and two male[8] paralectotypes from Lemien Forest, Berlinhafen (presently Aitape), East Sepik, Papua New Guinea. Carvalho & Gross (1979: 467) mention an additional specimens from Papua Barat collected by light trap.

Hosts: In Baiteta Forest, *H. cyanescens* Poppius, 1912 was recorded only once, by fogging, on *Neonauclea* sp. (Rubiaceae).

***Hyalopeplus* Stål, 1871**

References: *Hyalopeplus* Stål, 1871, as new genus; Carvalho & Gross 1979: 479-511, 512, 513, 514, 515, revision; Schuh 1995: 678-680, catalogue; Kerzhner & Josifov 1999: 203, catalogue; Schwartz & Chérot 2005: 8-9, discussion of subgenera validity; Schuh 2002-2013, online catalogue.

Type species: *Capsus vitripennis* Stål, 1855, by monotypy, a junior homonym of *Capsus vitripennis* Say, 1832, now *Hyalopeplus lineifer* (Walker, 1873a), cf. Kerzhner & Schuh, 1995: 2.

***Hyalopeplus (Adhyalopeplus) similis* Poppius, 1912c** (Plate 11 fig. 5)

Lectotype ♀ ZMHF of *Hyalopeplus similis* Poppius, 1912c, the designation by Carvalho in Carvalho & Gross 1979: 509: Tanzania: "Deutsch O. Africa, Nyassa-See, Langenburg, iv.1898, Fülleborn"[9] (FC n° 3775).

8 The male sex was then known since Poppius' original description (*contra* Carvalho & Gross 1979).

9 In their catalogue of Australian Heteroptera, Cassis & Gross (1995: 160) cite the type-locality of *Hyalopeplus similis* Poppius, 1912 as "Langenburg, New Guinea". However, Poppius (1912c: 8) described his new species from "Deutsch O. Afrika" for Deutsch Ostafrika, in English "German East Afrika", a German colony (between 1885 and 1918, the end of World War I) including what is now Burundi, Rwanda and the mainland part of Tanzania (German's Tanganyika). From 1896 to 1900, Friederich Georg Hans Fülleborn (1866-1933) "served as physician to troops in German East Africa with a special commission to pursue scientific studies (...). Dependent largely upon his own resources and ingenuity, he achieved marked success as a physician and in addition made noteworthy observations on the natural history of the region"






Lectotype ♂ ZMHF of *Hyalopeplus horvathi* Poppius, 1912c, the designation by Carvalho in Carvalho & Gross 1979: 509, the synonymy by Carvalho in Carvalho & Gross 1979: 508: Saõ Tomé: "Saõ Tomé, *Mocquerys*" (FC n° 3776).
Holotype ♂ ZMHF of *Hyalopeplus bakeri* Poppius, 1915a, the synonymy by Carvalho in Carvalho & Gross 1979: 508: Philippines Islands: Luçon: "Los Baños, *Baker*" (FC n°3777).
Additional material: Democratic Republic of Congo: 1♂ & 1♀ MRAC: Lualaba, Ruwe, xii.1960, Dr. V. Allard (FC n°s 365-366); 1♂ MRAC: idem, i.1961, Dr. V. Allard (Fc n° 367); French Polynesia: Tahiti: 15♂ & ♀ MNHN: Mahina, ix.1982, A. Villiers (FC n°s: 755-770); Ivory Coast: 1♀ MRAC: Bingerville, viii.1963, J. Decelle (FC n° 364); Papua New Guinea: Madang: 4♂ & 1♀ ISNB: Baiteta, 12.v.1993 O. Missa leg., *Dracontomelum dao* (Anacardiaceae), fogging (FC n°s 3833-3834, 3912-3913, sans n°); Philippines Islands: Luzon: 1♂, 2♀ BPBM: Ifugao Province, Liwo, 8 km E. Mayoyao, 01.vi.1967, 1000-1300m., H. M. Torrevillas, light trap (FC n°s 192-194); Saõ Tomé: 1♀ MRAC: 25.v.1975, J. Derron (FC n° 363); Seychelle Islands: Mahé: Mt. Fleuri: 1♀ MRAC: Mt. Fleuri, 4.i.1972, P. J. L. Roche (FC n° 361); 1♂ MRAC: idem, 23.i.1972, P. J. L. Roche (FC n° 362); Praslin: 1♀ CFC: Praslin LF, xi.1994, E. Heiss leg. (FC n° 1240).

References: *Hyalopeplus similis* Poppius, 1912c: 8, as new species; Carvalho & Gross 1979: 508-511, 512, 513-515, redescription, male genitalia, lectotype designation, synonymies; Schuh 1995: 680, catalogue; Schuh 2002-2013, online catalogue.
Discussion: *Hyalopeplus* (*Adhyalopeplus*) *similis* Poppius, 1912 is a widely distributed species, known from Africa (Congo, Ivory Coast, Saõ Tomé, Tanzania) to Pacific Islands (Tahiti) by way of India, Japan, SE Asia and Australia (Carvalho & Gross 1979; Cassis & Gross 1995; Schuh 1995; 2002-2013). It is also a relatively variable taxon, as showed by Carvalho & Gross' new synonymies (op. cit.: 511) and drawings of types (pp. 512-515, Figs 236-247). The validity of closely related *Hyalopeplus longirostris* Odhiambo, 1958, from West Africa, a species omitted in Carvalho & Gross (1979) work, should be analysed in detail.

(Stunkard 1934: 204). Moreover, "during the period 1898-1900 he held a special commission from the Konigl. Preuss. Akad. (= Prussian Akademie of Sciences) to undertake faunal and ethnological investigations of the Nyassa Province (...)", those researches covering "a wide range of subjects, extending from the spirochaetes and spirochaetosis through the diseases caused by protozoans, insects, arachnids, linguatulids, trematodes, cestodes, and nematodes" (op. cit.: 204, 205-206) but also geographical aspect of Nyassa Lake (now Lake Malawi). So, the type-locality of *H. similis* is probably situated in the former German's Tanganika territories. Pesenko & Pauly (2005: 154) confirm Langenburg is in Tanzania and give relatively accurate coordinates, quoting types of bees collected by Fülleborn at this place. According to these coordinates, Langenburg was close of the shores of Lake Malawi and of the limits between the present Iringa and Ruvuma administrative regions.

Mirini Hahn, 1833

Adelphocorisella Miyamoto, Yasunaga, 1993

References: *Adelphocorisella* Miyamoto, Yasunaga, 1993: 47, as new genus with two new species; Schuh 1995: 695, catalogue; Kerzhner & Josifov 1999: 59, catalogue; Malipatil & Chérot 2002: 103, discussion; Schuh 2002-2013, online catalogue.
Type species: *Adelphocorisella lespedezae* Miyamoto, Yasunaga, 1993, original designation.

Adelphocorisella brunnescens (Poppius, 1915a)

(Plate 13 figs 1-4)

Holotype by monotypy ♂ ZMHF: Papua New Guinea: Morobe: "Mus. Zool. Helsinki Loan n° HE05-36" / "*A. brunnescens* Miridae exot. Mirinae 1 Popp. Not *Adelphocoris*" / "*Adelphocoris brunnescens* Pop. Det. J.C.M. Carvalho" / "Mus. Zool. H:fors Spec. typ. No 10082 *Adelphocoris brunnescens* Popp." / "Mus. Zool. Helsinki Loan n° HE2974" / "*Adelphocoris brunnescens* sp. nov." (manuscript label) / "Holotipo" / "Simbang, Huon Golf" / "N. Guinea, Biró 1898".
Additional material ISNB: Papua New Guinea: Madang: 1♀: Baiteta, 26.iii.1993, O. Missa leg., on *Pometia pinnata* (Sapindaceae), light trap (FC n° 3988); 1♂: *idem*, 05.v.1995, O. Missa leg., on *Tristiropsis acutangula* (Sapindaceae), fogging (FC n°3985); 1?: *idem*, 03.vi.1995, O. Missa leg., on *Dracontomelum dao* (Anacardiaceae), light trap (FC n°3840); 1♂, 1?: *idem*, 14.vii.1995, O. Missa leg., on *Neonauclea* sp. (Rubiaceae), fogging (FC n°s 3986, 3986a); 1?: *idem*, 17.vii.1995, O. Missa leg., on *Chisocheton wenlandia* (Meliaceae), fogging (FC n°3846); 1♀: *idem*, 29.vii.1995, O. Missa leg., on ?, fogging (FC n°3987); 1♂: *idem*, 02.viii.1995, O. Missa leg., on *Dysoxylum patigravianum* (Meliaceae), light trap (FC n°3847); 1♂: *idem*, 03.viii.1995, O. Missa leg., ?, fogging (FC n°3849); 4♂, 1♀, 2?: *idem*, 1995, O. Missa leg., on *Piteleocarpus indicus* (Fabaceae), fogging (FC n°s 3839, 3841-3845, 3848); 1♀: idem, 26.iv.1996, O. Missa leg., on ?, fogging (FC n°3989) (ISNB); 1♀: Wanuma, viii.1968, N. L. H. Krauss leg. (compared with the type by J.C.M. Carvalho) (FC n° 4263) (MNRJ); Morobe: 1♂, 1♀: Bulolo, 24.v.1982, P. Grootaert leg. (FC n°s 267-268); 1♀: Mandy Passage, 04.v.1982, P. Grootaert leg (FC n° 269).
Other taxa examined for comparison: *Adelphocorisella lespedezae* Miyamoto & Yasunaga,





1993: Japan: Honshu: paratypes: 1♂ & 1♀ HUES: Aomori-Ken (Amoari Prefecture), Yokouchi-Yaegiku, Aomori-shi (Amoari city), Japan, 29.viii.1992., T. Ichita leg. (FC n°s: 203-204). *Adelphocorisella australis* Malipatil, Chérot, 2002 ANIC: Australia: Queensland: holotype (♂): Big Mitchell Creeck, Mareeba-Molloy Road, 04.v.1967, D. H. Coless leg.

References: *Adelphocoris brunnescens* Poppius, 1915a: 35, as new species. *Waucoris brunnescens*: Carvalho 1987b: 156-157, new combination, redescription, MG; Schuh 1995: 672, 971, catalogue [10]; Carpintero & Chérot 2002: 46, 52, MG, FG, discussion; Schuh 2002-2013, online catalogue. *Adelphocorisella brunnescens*: Chérot & Malipatil 2016: 159, new combination.

Discussion: Carvalho (1987b: 156-157) described his new genus *Waucoris* to accommodate all species described by Poppius (1915a) under the name *Adelphocoris* Reuter, 1896 from the Indo-Australian region and selected *Adelphocoris keyensis* Poppius, 1915 as type species. Unfortunately, Carvalho's description (op. cit.: 156) of the new genus is very short. He separates *Waucoris* from *Adelphocoris* by the absence of phallic comb, by the shape of larger areola of membrane and by the colouration of tibial spines (yellow or brown pale in *Waucoris*, black in *Adelphocoris*).

On the basis of these character states, *A. brunnescens* Poppius, 1915a was classified in *Waucoris*. *A. brunnescens* was described on the male holotype from Simbang, Huon Golf (Morobe, Papua New Guinea) alone. Carvalho (1987b) and Carpintero & Chérot (2002) cite additional specimens from Papua New Guinea (Central Province, Madang, Morobe, New Britain).

The study of some of those specimens clearly shows that *A. brunnescens* differs of the other *Waucoris* species. *Waucoris keyensis* (Poppius, 1915), *Waucoris papuanus* (Poppius, 1915) and *Waucoris wauensis* Carvalho, 1987 are larger, non *Phytocoris*-like, frequently yellow, orange or black, shiny bugs, with a simple, recumbent, white dorsal pilosity and classical metafemora, devoid of a pair of erect stiff black setae on anterior corners of pronotum of the females (these setae are obvious in *Adelphocorisella* species females, they are present only in the males of true *Waucoris*, and more reduced, narrower).

A. brunnescens (Poppius, 1915a) agrees with original description of *Adelphocorisella* by Miyamoto & Yasunaga (1993: 47-48) in virtually all major characters. The measurements, the relatively elongate, *Phytocoris*-like habitus, the light brown dorsal colouration tinged with red, the dull aspect of dorsal surface, covered with silvery recumbent silky pubescence and sparse brownish suberect setae, the long antenna with the three last segments subequal in thickness, the pair of erect, stiff, black setae on anterior corners of pronotum of both sexes, the hemelytra with a sparse, narrow and shallow punctation, the long legs with red spots and the metafemora broadest and flattened basally, with a furrow on dorsal surface, are very similar to those of *A. lespedezae* Miyamoto & Yasunaga, 1993 and *A. australis* Malipatil & Chérot, 2002. The male genitalia of *A. brunnescens* were described by Carvalho (1987b: 157, figs 2-4) and Carpintero & Chérot (2002: 52, figs 28-29). They are close to the structures described by Malipatil & Chérot (2002: 101, figs 2-6) in *A. australis*, particularly the stout right paramere, with small primary apophysis, secondary and tertiary lobes, the very large secondary gonopore and the elongate apically curved true spiculum. However, the two species can be easily separated by the shape and position of other phallic sclerites (two small sclerites near the secondary gonopore in *A. australis*, a convoluted ACH in *A. brunnescens*). Female genitalia of *A. australis* (cf. Malipatil & Chérot op. cit., 102, figs 9-10), *A. brunnescens* (cf. Carpintero & Chérot op. cit., 52, figs 30-31) and, less obviously, *A. lespedezae* (cf. Malipatil & Chérot op. cit., 102, figs 7-8) are also relatively similar (shape of parieto-vaginal rings, rings laterally reinforced, B and E structures of posterior wall reduced). Consequently, Chérot & Malipatil (2016) suggested the following new combination: *Adelphocorisella brunnescens* (Poppius, 1915a) we are able to confirm here.

Hosts: In Baiteta Forest, 18 specimens of *Adelphocorisella brunnescens* (Poppius, 1915a) were recorded in 12 independent collection events, by fogging and by light trap, on 7 different identified host plants: *Chisocheton welandia* (Meliaceae), *Dracontomelum dao* (Anacardiaceae), *Dysoxylum patigravianum* (Meliaceae), *Neonauclea* sp. (Rubiaceae), *Pitelocarpus indicus* (Fabaceae), *Pometia pinnata* (Sapindaceae) and *Tristiropsis acutangula* (Sapindaceae). A partially zoophagous behavior of this species is not impossible. It could explain these observations.

Note: The holotype by monotypy is preserved in

10 As pointed out by Chérot & Malipatil (2016: 159) "Schuh (op. cit.: 971) incorrectly cites "Poppius, 1914b: 383" as original reference and *Lygus brunnescens* Poppius, 1914 as original combination for this species, thus misinterpreting Carvalho's (1987b) new combination of *Adelphocoris brunnescens* Poppius, 1915a".






ZMHF not in HNHM as stated by Poppius (1915a: 35).

Apolygus China, 1941

References: *Lygocoris Apolygus* China, 1941: 60, as new subgenus; Schuh 1995: 792-793, 793-806, catalogue; Lu & Zheng 1997: 162, rank upgrade; Zheng et al. 2005: 137-182, 695-696, redescription, in fauna; Schuh, 2002-2013, online catalogue.

Type species: *Lygaeus limbatus* Fallén, 1807 by original designation.

Apolygus sp.

Additional material ISNB: Papua New Guinea: Madang: 1♀: Baiteta, 26.iii.1993, O. Missa leg., on *Pometia pinnata* (Sapindaceae), light trap (FC n° 4060); 2♀: Baiteta, 19.v.1993, O. Missa leg., on *Pometia pinnata* (Sapindaceae), light trap (FC n°s 4056, 4061); 1♂: Baiteta, 30.vi.1995, O. Missa leg., on *Ficus* sp. (Moraceae), fogging (FC n° 4058); 1♀: Baiteta, 24.iv.1996, O. Missa leg., on *Chisocheton ceramicus* (Meliaceae), light trap (FC n° 4059); 1♂: Baiteta, 05.vi.1996, O. Missa leg., on *Buchanania heterophylla* (Anacardiaceae) or *Hernandia ovigera* (Hernandiaceae) or *Vitex cofassus* (Verbanaceae), light trap (FC n° 4057).

Discussion: We attribute with some doubt these specimens, collected by fogging and by light trap on four different host plants, to the large genus *Apolygus* China, 1941. Additional male specimens will be useful to identify the taxon to the species level.

Argenis Distant, 1904a

References: *Argenis* Distant, 1904a: 107, as new genus; Schuh 1995: 700, catalogue; Chérot 1997a: 397-398, redescription; Zheng et al. 2005: 204, 686, 698, redescription, in fauna; Schuh, 2002-2013, online catalogue.

Type species: *Capsus incisuratus* Walker, 1873b, by monotypy.

***Argenis incisuratus* (Walker, 1873b)** (Plate 14 fig. 5, plate 15 figs 1-6, plate 16 figs 1-9)

Holotype ♂ BMNH: Sri Lanka: "Ceylan (*Thwaites & Green*), Peradenyia, vi.1905" / "Distant Coll. 1911-383".

Additional material: Papua New Guinea: Madang: 8♀ ISNB: Baiteta, 16.iii.1993, O. Missa leg., on *Dracontomelum dao* (Anacardiaceae), light trap (FC n°s 3995-4002); 1♂ & 2♀ ISNB: Baiteta, 12.v.1993, O. Missa leg., on *Dracontomelum dao* (Anacardiaceae), fogging (FC n°s 3823-3825); 1♀ ISNB: Baiteta, 12.v.1993, O. Missa leg., on *Dracontomelum dao* (Anacardiaceae), light trap (FC n° 4008); 1♀ ISNB: Baiteta, 17.v.1993, O. Missa leg., on *Dracontomelum dao* (Anacardiaceae), light trap (FC n° 4003); 1♀ ISNB: Baiteta, 17.v.1993, O. Missa leg., on ?, fogging (FC n° 4004); 3♀ ISNB: Baiteta, 19.v.1993, O. Missa leg., on *Pometia pinnata* (Sapindaceae), light trap (FC n°s 3990-3992); 2♂ ISNB: Baiteta, 20.v.1993, O. Missa leg., on *Pometia pinnata* (Sapindaceae), light trap (FC n°s 3993-3994); 1♂ ISNB: Baiteta, 10.v.1995, O. Missa leg., on *Chisocheton ceramicus* (Melicaceae), fogging (FC n° 4007); 1♂ ISNB: Baiteta, 06.vi.1995, O. Missa leg., on *Celtis philippinensis* (Ulmaceae), fogging (FC n° 4006); 1♀ ISNB: Baiteta, 22.vi.1995, O. Missa leg., on *Neonaucela* (Rubiaceae), fogging (FC n°s 3835); 12♂, 9♀, 4? ISNB: Baiteta, 03.viii.1995, O. Missa leg., on *Dysoxylum patigravianum* (Meliaceae), fogging (FC n°s 3798-3822); 1♀ & 1? ISNB: Baiteta, 03.viii.1995, O. Missa leg., on *Artocarpus incisus* (Moraceae), fogging (FC n°s 3826, 3836); 1♂ ISNB: Baiteta, 04.viii.1995, O. Missa leg., on *Neonauclea sp.* (Rubiaceae) or *Ficus crassiramea* (strangler fig, Moraceae), fogging (FC n° 3837); 1♂ ISNB: Baiteta, 1995, O. Missa leg., on *Chisocheton ceramicus* (Melicaceae), fogging (FC n° 4005); 1♀(?) ISNB: Baiteta, iv.1996, O. Missa leg., on ?, light trap (FC n°s 4011); 1♂ ISNB: Baiteta, 01.v.1996, O. Missa leg., on ?, fogging (FC n°s 4010); 1♂ ISNB: Baiteta, 03.vi.1996, O. Missa leg., on *Dracontomelum dao* (Anacardiaceae), light trap (FC n°s 3838); 1♂ ISNB: Baiteta, 28.vi.1996, O. Missa leg., on ?, fogging (FC n°s 4009); Milne Bay: 1♂ MNRJ: Alotau, 14-28.ii.1969, Sedlacek J. et M. leg. (FC n°4413).

References: *Capsus incisuratus* Walker, 1873b: 121, as new species; *Argenis incisuratus* Distant 1904a: 107 (new combination); Carvalho & Gross 1979: 443, redescription, MG; Schuh 1995: 700, catalogue; Chérot 1997a: 399-400, redescription, FG; Zheng et al. 2005: 204-205, 686, 698, redescription, in fauna; Schuh 2002-2013, online catalogue.

Discussion: *Argenis incisuratus* was described by Walker (1873b: 121) on the basis of the male holotype from Ceylan alone. The species is recorded from Papua New Guinea for the first time.

Variability of external morphology and colouration was almost unawarded by all authors describing or redescribing this taxon (Walker 1873b; Distant 1904a & c; Carvalho & Gross 1979; Chérot 1997a). However, *Argenis incisuratus* is a very variable species, for a lot of character states, to such extent that some specimens could be easily missclassified in the genus *Tinginotopsis*. On the specimens from Baiteta Forest, the following states of characters are particularly variable:

(1) The colouration of dorsal surface of head. The dorsal surface of head (vertex and frons) is yellow to orange brown (Plate 15 fig. 1), frequently with a dark brown medial stripe on the sulcus (Plate 15









fig. 2), obvious on the holotype, or with a grey patch (Plate 15 fig. 3). Sometimes the dorsal surface of head is totally dark brown, as on the specimen studied by Carvalho & Gross (op. cit. p. 443, fig. 29);
(2) The colouration of dorsal surface of pronotum. The dorsal surface of pronotum is yellow to orange brown, frequently with brown or grey patches or stripes:
(a) some specimens have only a medial brown patch on hump's area;
(b) some specimens have two or three submedian dark brown to grey stripes arising from posterior margins of pronotal disk:
i. on the holotype, they are "W-shaped" (or crown-like),
ii. on some specimens from Baiteta Forest, they are reduced to two subparallel or slightly curved stripes (Plate 16 figs 3-4) or drop-like patches (Plate 15 fig. 4),
iii. on some other specimens they are conflating before or after the hump and eventually conflating with a stripe arising from the posterior margin of the pronotal collar (Plate 15 figs 5-6, arrow 1);
(c) almost all specimens from Baiteta Forest have a stripe arising, it, medially from the posterior margin of the pronotal collar (Plate 15 figs 4-5);
(d) almost all specimens from Baiteta Forest also have a pair of grey stripes lining the orange-yellow lateral area of pronotal margins (Plate 15 fig. 5, arrow 2), the margins being grey. Sometimes, the grey stripes directly identify the lateral margins (Plate 15 fig. 6, arrow 2);
(e) some specimens have a totally dark brown or grey pronotum, as on the specimen studied by Carvalho & Gross (op. cit. p. 443, Fig. 29);
(3) The globose areas of humeral angles are absent or very reduced on several specimens (Plate 16 fig. 1), slightly tarnished with brown (Plate 16 fig. 2) or marked (as the holotype but also several specimens from Baiteta Forest, Plate 16 fig. 3);
(4) The pronotal hump is almost absent or very reduced, the corresponding area being tarnished with brown (Plate 16 fig. 4) or developed, large (Plate 16 fig. 5);
(5) The "*Tinginotum*-like" pruinose silvery patches of clavus (and even some of parts of corium) can be obvious (Plate 16 fig. 7, arrows) or reduced (Plate 16 fig. 8, arrow) to absent (Plate 16 fig. 9).

In their keys of genera, Zheng et al. (2005) separate *Argenis* from the genera *Tinginotum* Kirkaldy, 1902a and *Tinginotopsis* Poppius, 1915b by the uniformly clear yellow exocorium (except a small brown patch, prolongation of endocorial large patch). Unfortunately, a species such as *Tinginotopsis tuberculatus* Eyles, 2000 (cf. Eyles 2000: 117, Fig. 29) also has an exocorium that is uniformly clear yellow. To make the matter worse still, all recent authors looking for differences between *Tinginotum* Kirkaldy, 1902a and *Tinginotopsis* Poppius, 1915b (as Carvalho 1987a; Yasunaga 1999; Eyles 2000) stress the pronotal hump (gibbosity) of the latter. However, the variability of this state of character combined with variability of "*Tinginotum*-like" hemelytral pruinose silvery patches in *Argenis* is such that several specimens of *A. incisuratus* from the same series (collected the same day, on the same tree) could easily be classified in the three genera *Argenis*, *Tinginotum* and *Tinginotopsis*. The validity of these genera should be analysed on a world scale, including Indo-Pacific, Australian and African species of the group.
Hosts: In Baiteta Forest, 55 specimens of *Argenis incisuratus* (Walker, 1873) were recorded in 18 independent collection events, by light traps and by fogging, from *Artrocarpus incisus* (Moraceae), *Celtis philippinensis* (Ulmaceae), *Chisocheton ceramicus* (Meliaceae), *Dracontomelum dao* (Anacardiaceae), *Dysoxylum patigravianum* (Meliaceae), *Neonauclea* sp. (Rubiaceae) and *Pometia pinnata* (Sapindaceae). If the 25 specimens collected (by fogging) on *Dysoxylum patigravianum* were found during one collection event, the 14 specimens collected on *Dracontomelum dao*, by fogging and by light trap, were found during 5 independent collection events.

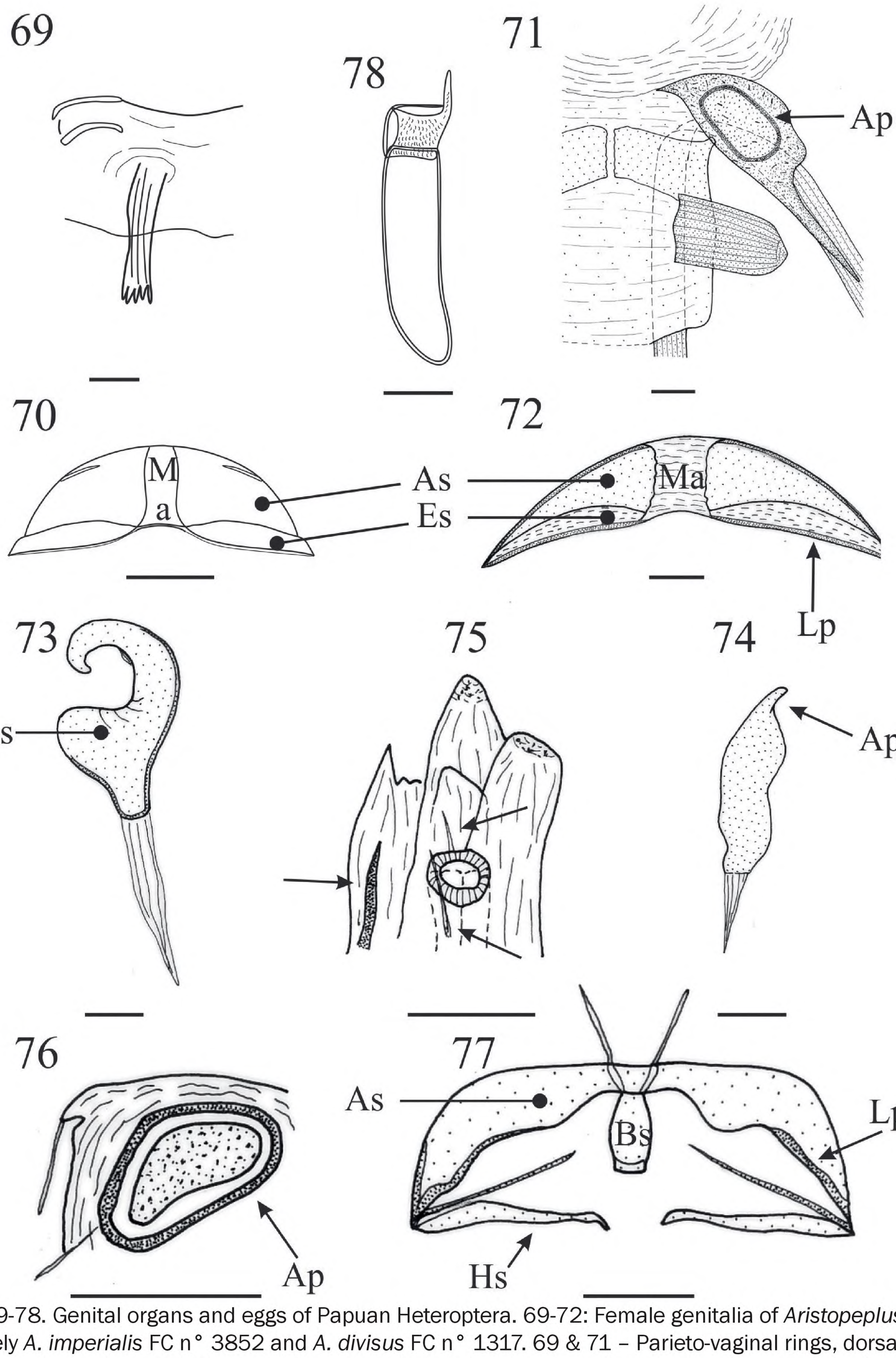
***Aristopeplus* Poppius, 1912a**

References: *Aristopeplus* Poppius, 1912a: 421, as new genus; Carvalho & Wallerstein 1977: 49-53, revision; Schuh 1995: 700, catalogue; Kerzhner & Schuh 2001: 286, correction to Schuh's catalogue; Schuh 2002-2013, online catalogue.
Type species: *Aristopeplus imperialis* Poppius, 1912a, original designation.

***Aristopeplus imperialis* Poppius, 1912a** (Figs 69-70, 78, plate 13 fig. 11)

Additional material 1♀ ISNB: Papua New Guinea: Madang: Baiteta, 09.iv.1996, O. Missa leg., on *Dysoxylum arnoldianum* or *Homalium foetidum* (Meliaceae and Flacourtiaceae respectively), light trap (FC n° 3852).
Other taxa examined for comparison (Plate 13 figs 12-14): *Aristopeplus divisus* (Walker, 1873b). Indonesia: Ternate Island: Holotype ♂ BMNH: "*Saunders* 65-13" (FC n° NE 14); 1♂: same label than the holotype (FC n° NE187) [11]. The Moluccas: Morotai: 1♀ AMNH:

11 Walker (1873b: 163) cites explicitely only one



Figures 69-78. Genital organs and eggs of Papuan Heteroptera. 69-72: Female genitalia of *Aristopeplus* species, respectively *A. imperialis* FC n° 3852 and *A. divisus* FC n° 1317. 69 & 71 – Parieto-vaginal rings, dorsal view; 70 & 72 – Posterior wall; 73-77: *Diognetus intonsus* Distant, 1904c, genitalia of both sexes. 73-75 – ♂ genitalia of FC n° 81; 73 – Left parameres; 74 – Right parameres; 75 – Endophallus; 76-77 – ♀ genitalia of FC n° 82; 76 – Parieto-vaginal rings, dorsal view; 77 – Posterior wall; 78 – *Aristopeplus imperialis* FC n° 3852 egg [scale bar 0.1 mm, except fig. 74 scale bar 0.05 mm, figs 70 and 78 scale bar 0.5 mm].

specimen in his type series. In Walker's catalogue, the specimens are cited, for each species, after references or descriptions and coded with a letter. When Walker had several specimens from the same "place"– often a relatively large area – and collector, he used as many letters as necessary, separated by a dash, for example "a-d. England. From M. Stephens' collection." (Walker, op. cit.: 49, about *Miris erraticus*). About *Monalonion divisum* (original combination), Walker (1873b: 163) wrote "a. Ternate. From Mr. Wallace's collection". The description

Dutch East India, Morotai, 1944, *Ernest Reimchiissel* (FC n° 1317). *Aristopeplus regalis* Poppius, 1912. Papua New Guinea: Central Province: Lectotype ♀ ZMHF [the designation by Carvalho & Wallerstein, 1977: 51]: "Moroka, vii-xi.1893, *Loria*" (FC n° 4934). East Sepik: 1♀ MNRJ: Amok, 06.i.1960, Maa T. C. leg. (Compared with the type by J.C.M. Carvalho) (FC n° 4223). *Aristopeplus rubronotus* Carvalho & Wallerstein, 1977. Papua New Guinea: Woodlark Island (Murua): Holotype ♂ MNRJ: "Woodlaark I. (Murua), Kulumadau, 03.ii.1957, Brandt W. W." (FC sans n°).

References: *Aristopeplus imperialis* Poppius, 1912a: 421, as new genus; Carvalho & Wallerstein 1977: 50-51, redescription; Schuh 1995: 700, catalogue; Kerzhner & Schuh 2001: 286, correction to Schuh's catalogue; Schuh 2002-2013, online catalogue.

Addition to the original descriptions: The female genitalia of *Aristopeplus* species were still unknown. They are described hereafter for the first time, for two species, *A. imperialis* and *A. divisus*. Unfortunately, we did not have the opportunity to study the female genitalia of the two other species, even though we examined several specimens of them.

Female genitalia of *A. imperialis*. Seminal depository unknown. Parieto-vaginal rings difficult to see, dorsal labiate plate apparently with three sclerotisations (Fig. 69) or reinforcements and ventral labiate plate unsclerotised. Dorsal wall membranous, lateral oviducts stout and elongate. Posterior wall (Fig. 70) elongate. B structure absent, the inter-ramal sclerites or A structures (As) linked only by a membranous area (Ma), dorsal margin straight to slightly concave and ventral margins convex. Lateral lobes or H structures absent. Egg (Fig. 78) with long horn.

Female genitalia of *A. divisus*. Seminal depository lacking ring. Parieto-vaginal ring (Fig. 71, Ap) elongate, anterior and posterior margins straight, latero-inner and latero-outer margins convex, shorter distance between rings longer than length of major axis; no prolongation on ring margins; dorso-labiate plate large, complex in shape, pointed apically and basally, margins unreinforced; ventral labiate plate unsclerotised; dorsal wall membranous, lateral oviduct stout. Posterior wall (Fig. 72) elongate. B structure absent, inter-ramal sclerites or A structures (As) linked only by a membranous area (Ma); dorsal margin straight to slightly concave and ventral margins convex. Inter-ramal lobes or E structures (Es) elongate, fused with a pair of lateral plates (Lp). Lateral lobes or H structures absent.

Discussion: *Aristopeplus imperialis* Poppius, 1912 was described on the basis of the male holotype from Friedrich-Wilhelmshafen (= Madang, Madang Province, Papua New Guinea) alone. Carvalho & Wallerstein (1977: 51) mention one additional female specimen from Milne Bay, Papua New Guinea.

Hosts: Unknown still. In Baiteta Forest, the specimen of *Aristopeplus imperialis* Poppius, 1912 was recorded, by light trap, from *Dysoxylum arnoldianum* (Meliaceae) or *Homalium foetidum* (Flacourtiaceae).

Bertsa Kirkaldy, 1904

References: *Bertsa* Kirkaldy, 1904: 702, as nomen novum for *Berta* Kirkaldy, 1902b; Yasunaga 1992a: 31-32, redescription; Schuh 1995: 701-702, catalogue; Cassis & Gross 1995: 163, catalogue; Kerzhner & Josifov 1999: 70, catalogue; Chérot 2000: 312-315, generical validity; Zheng et al. 2005: 205-206, 687, 699; Schuh 2002-2013, online catalogue.

Type species: *Capsus lankanus* Kirby, 1891, by monotypy.

Bertsa lankana (Kirby, 1891) (Plate 14 fig. 6)

Additional material ISNB: Papua New Guinea: Madang: 1♀: Baiteta, 17.v.1993, O. Missa leg., on *Dracontomelum dao* (Anacardiaceae), light trap (FC n° 3898); 1♀: *idem*, 19.v.1993, O. Missa leg., on *Pometia pinata* (Sapindaceae), light (FC n° 3896); 1♂: *idem*, 31.v.1993, O. Missa leg., on *Pometia pinata* (Sapindaceae), light (FC n° 3897); 1♂: *idem*, 06.vi.1995, O. Missa leg., on *Celtis philippinensis* (Ulmaceae), fogging (FC n° 3895); 1♀: *idem*, 15.iv.1996, O. Missa leg., on *Terminalia sepinkana* or *Piteleocarpus indicum* (Combretaceae), light trap (FC n° 3894).

References: *Capsus lankanus* Kirby, 1891: 107, as new species; *Bertsa lankana*: Yasunaga 1992a: 20, record from Japan, male genitalia; Schuh 1995: 702, catalogue; Cassis & Gross 1995: 163, lectotype designation, catalogue; Kerzhner & Josifov 1999: 70, catalogue; Chérot 2000: 312-315, 317, discussion, female genitalia; Zheng et al. 2005: 206-208, redescription, in fauna, MG; Schuh 2002-2013, online catalogue.

Discussion: *Capsus lankanus* Kirby, 1891 was described on the basis of some type specimens from "Ceylan". Kirby's (1891: 107) inaccurate original description does not give information about

does not mention any variability. Consequently, the membership of the second specimen to Walker's type series is doubtful. Carvalho & Wallerstein (1977: 50) did not even cite it.






type-series size. However, the short text includes several data about species variability. We can consequently conclude that Kirby examined more than one specimen. Additional specimens from Australia, China, Indonesia, Japan, Malaysia and the Philippines were cited by subsequent authors (Cassis & Gross 1995; Chérot 2000; Yasunaga 1992a; Zheng et al. 2005). The species is recorded for the first time from Papua New Guinea.

According to Zheng et al. (2005: 687), *Bertsa lankana* (Kirby, 1891) could easily be distinguished from their new Chinese species, *B. major*, by the colouration of dorsal pilosity, the extension of the eyes in lateral view and the shape of the left paramere primary apophysis' apex. On the basis of these characters states, our specimens could be classified as *B. lankana*, all of the three species described from Micronesia (cf. Carvalho 1956; Chérot 2000) differing by the overall colouration.

Hosts: The specimens of *Bertsa lankana* (Kirby, 1891) of Baiteta Forest were recorded in five independent collection events, by fogging and light trap, on *Celtis philippinensis* (Ulmaceae), *Dracontomelum dao* (Anacardiaceae) and *Pometia pinnata* (Sapindaceae). Yasunaga (1992a) quotes the species on *Mallotus* sp. (Euphorbiaceae) and as sometimes attracted at light in Japan.

Diognetus Distant, 1904c

References: *Diognetus* Distant, 1904c: 431-432, as new genus; Carvalho 1959: 85, catalogue; Schuh 1995: 760, catalogue; Schuh 2002-2013, online catalogue.

Type species: *Diognetus intonsus* Distant, 1904c, by original designation.

= *Diophantus* Distant, 1909b: 510, as new genus; Distant 1910b: 253, copy of original description; Carvalho 1952: 94, new generical synonymy; Carvalho 1959: 85, catalogue; Schuh 1995: 760, catalogue; Schuh 2002-2013, online catalogue.

Type species: *Diophantus literatus* Distant, 1909b, by monotypy (cited as type species by Distant, 1910b: 252).

= *Gorna* Poppius, 1914a: 130 **syn. nov.**, as new genus; Carvalho 1959: 96, catalogue; Schuh 1995: 760, catalogue; Schuh 2002-2013, online catalogue.

Type species: *Gorna pilosa* Poppius, 1914a, by original designation.

Redescription: Mid-sized mirine bug, with double dorsal pilosity, including long, stiff, erect, brown to black, bright setae and shorter, adpressed, slightly silky, golden to ochraceous setae. Head: Dorsal surface yellow to dark brown, sometimes with brown strip in slight median incurvation, lacking sulcus. Clypeus free, uncovered by the frons in dorsal view; maxillary and mandibular plates without carina or tubercle; punctation and striation of frons and vertex narrow and shallow; the setae stiff, elongate (particularly on frons), erect. Eyes pilose, dark brown, large, reaching pronotal apical ring in dorsal view. Two last antennal segments narrower than second, all sub-cylindrical; first and second segments with long, stiff, erect, brown to black setae. Vertex marginate. Labium reaching meso- or metacoxae. Thorax. Pronotum: Dorsal surface yellow to dark brown, with a narrow yellow posterior margin and a larger sub-apical dark brown to black transverse fascia (sometimes shaded medially). Punctation wide and relatively deep, dense. Pilosity long, stiff, sub-erect to erect, brown to black, shiny, particularly dense and long on lateral margins. Pronotal callosities large, with dark anterior patches in some males. Posterior pronotal margin straight medially; humeral angles smoothly curved; lateral margins lacking carinal knob. No globose area. Scutellum: Relatively flat. Dorsal surface yellow to dark brown, apex yellowish. Punctation and striation narrow and shallow. Pilosity double, including long, stiff, erect, brown to black, bright setae and shorter, adpressed, slightly silky, golden to ochraceous setae. Mesoscutum uncovered, with lateral fossae, pilosity silky, adpressed. Legs: Pilose, setae very elongate, stiff, erect. Tibias with brown spines and black spinulae. Hemelytra: Surface opaque, yellow brown to dark brown with darker patches, red bright in some males. Striation of clavii and coria narrow and shallow. Punctation of clavii and coria relatively wide and deep, more reduced apically on coria, sometimes even indistinct. No Hyalopepline-like line of punctations along the claval vein. Pilosity double, including long, stiff, erect, brown to black, bright setae (common on lateral margins of exocorium) and shorter, adpressed, slightly silky, golden to ochraceous setae. Cuneus brown to red shiny with a basal yellow line. Membrane fuscous, mottled with grayish beyond the middle. Male more elongate, female more rounded, stout.

Discussion: Based on the examination of the lectotypes and holotype by monotypy, we consider the nominal genera *Diognetus* and *Gorna* as synonyms. The three nominal species perfectly conform to both generic descriptions given by Distant (1904c) and Poppius (1914a). The habitus of the type species are very similar: the ovate shape of female, the head structure (particularly the





marginate vertex and antenna shape), the double dorsal pilosity, including long, stiff, erect, brown to black setae and shorter, adpressed, slightly silky, golden to ochraceous setae, the dorsal punctation (wide and relatively deep on the pronotum, more reduced, shallow on the hemelytra) are nearly identical. Accordingly, we propose that the three nominal species are congeneric and suggest the new generical synonymy:

***Diognetus* Distant, 1904b**

= *Gorna* Poppius, 1914a **syn. nov.** (new subjective junior synonym)

***Diognetus intonsus* Distant, 1904c** (Figs 73-77, 79-85, plate 14 figs 7-9)

= *Diognetus literatus* (Distant, 1909b): 510-511 **syn. nov.**

Lectotype ♀ BMNH of *Diognetus intonsus* Distant, 1904c [**present designation**]: Sri Lanka: lectotype: Ceylan: Maskelyia, Green.

Lectotype ♀ BMNH of *Diognetus literatus* (Distant, 1909b) [**present designation**]: Sri Lanka: Ceylan: Ohiya, Green (very damaged specimen).

Additional material: India: 1♂ BMNH: south India, T.V. Campbell, Coll. B.M. 1930-599 (FC n° 81); Sri Lanka: 1♂: Maskelyia, Green." (classified as intonsus); 1♂ BMNH: Ohiya, Green" (classified as literatus); 1♀: Uva, P. Madulsima, 12.xii.1908, T.B.F. (FC n° 82); 1♂ AMNH: N.E., Dist. Kanda-Ela, Reservoir, 5-6 min S.O. Nuwara Elyia, 6200 feets, 10-21.ii.1970, Davis & Row (FC n° 1316). Papua New Guinea: 1♂ ISNB: Madang: Baiteta, 14.vii.1995, O. Missa leg., on *Neonauclea* sp. (Rubiaceae), fogging (FC n° 3989).

Other taxa examined for comparison: Diognetus sp.: Philippines Islands: Negros Island: 1♂ & 1♀ AMNH: 1300 feets, Camp Lookout, Dunagete, 15.ii – 15.iv.1961, T. Schneirla & E. Reyes (FC n°s 1317-1318).

References: *Diognetus intonsus* Distant, 1904c: 432, as new species; Carvalho 1959: 85, catalogue; Schuh 1995: 760, catalogue; Schuh 2002-2013, online catalogue; *Diognetus literatus* (Distant, 1909b): 510-511, as a new species; Distant 1910b: 253; Carvalho 1952: 94, comb. nov., in catalogue; Carvalho 1959: 85, catalogue; Schuh 1995: 760, catalogue; Schuh 2002-2013, online catalogue.

Redescription: External anatomy - see generic redescription: Measurements in mm (male FC n° 82 – female FC n° 83): Total length: 5.96 – 5.28; width: 1.8 – 2.8; medial length of pronotum: 1.02 – 1.06; posterior width of pronotum: 1.71 – 1.81; vertex width: 2.24 – 1.35; eyes width: 0.42 – 0.37; length of antennal segments: I: 0.61 – 0.53; II: 1.90 – 1.82; III: 0.82 – 0.92; IV: broken; medial length of scutellum: 0.90 – 0.73; basal width of scutellum: 0.86 – 0.86; length of cuneus: 0.86 – 0.86; width of cuneus: 0.73 – 0.69.

Male genitalia: Left paramere with large sensory lobe (Fig. 73, Ls). Right paramere with blunt primary apophysis (Fig. 74, Ap1). Endophallus including three tiny sclerites (Fig. 75, arrows).

Female genitalia: Seminal depository membranous, devoid of sclerite. Parieto-vaginal rings (Fig. 76, Ap) large, totally separated, anterior, posterior and outer margins straight, inner margins convex. Anterior margin of dorsal labiate plate slightly sclerotised laterally. Ventral labiate plate sclerotised. Posterior wall elongate (Fig. 77), the B structure (Bs) restricted to quadrangular base (or dorsal structure), without median process (or foot) and posterior plate, inter-ramal sclerites or A structures (As) with curved dorsal margin and straight ventral and lateral margins. No true inter-ramal lobes or E structure but a pair of lateral plates (Lp). Lateral lobes or H structures (Hs) elongate.

Discussion: *D. intonsus* was described at least on a female from Maskelyia, Ceylon and is recorded from Papua New Guinea for the first time. *D. literatus* was described at least on a female from Ohyia, Ceylon. The Museum of Natural History's collections include also a male of each nominal species, belonging apparently to the corresponding type-series but lacking type label. Because Distant's texts (1904c, 1909) do not include information on type-series size, on the sex of the examined specimen(s) or on the species variability, and because these male specimens are lacking type label, their nomenclatorial status remain unclear. Consequently, we apply the Recommendation 73F of the fourth edition of International Code of Zoological Nomenclature (ICZN 1999: 80-81) and we designated the two females as lectotype of their respective nominal species.

Both nominal species *D. intonsus* and *D. literatus* are very close. The total length (5.5 mm); the frons and vertex slightly curved medially with a longitudinal dark brown stripe; the large eyes, joining the anterior margin of pronotum; the antenna yellow brown, with the first segment about as long as the head, the second about three times as long as the first; the posterior part of pronotum with a sub-apical transverse fascia dark brown to black, larger in the male than the female (the black spots of humeral angles mentioned by Distant, 1909b, in *D. literatus* are in fact the extremities of this fascia, this is obvious on the female lectotype); the pronotal posterior margin yellowish, as the apex of scutellum; the hemelytra ochraceous; the cuneus shiny castaneous (female)





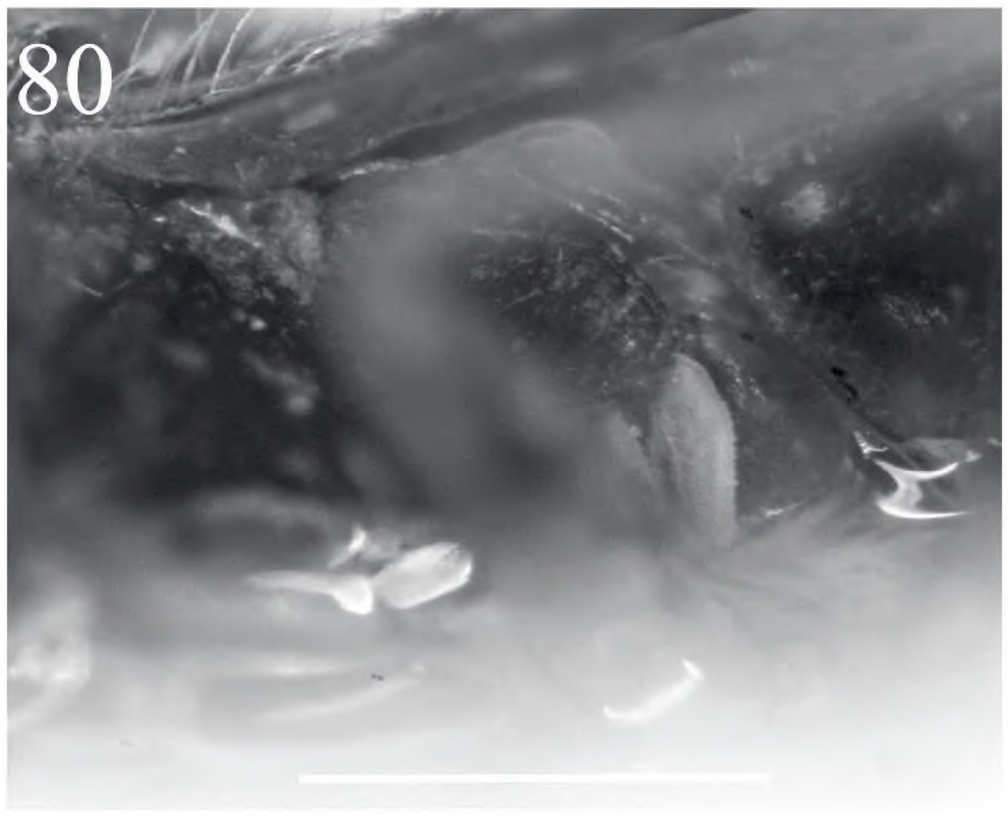

to red (male); the membrane fuscous, mottled with grayish beyond the middle are virtually the same. Accordingly, we propose the following synonymy: *Diognetus intonsus* Distant, 1904b = *D. literatus* (Distant, 1909b) (**new subjective junior synonym**). Hosts: In Baiteta Forest, *Diognetus intonsus* was recorded once, by fogging, on *Neonauclea* sp.

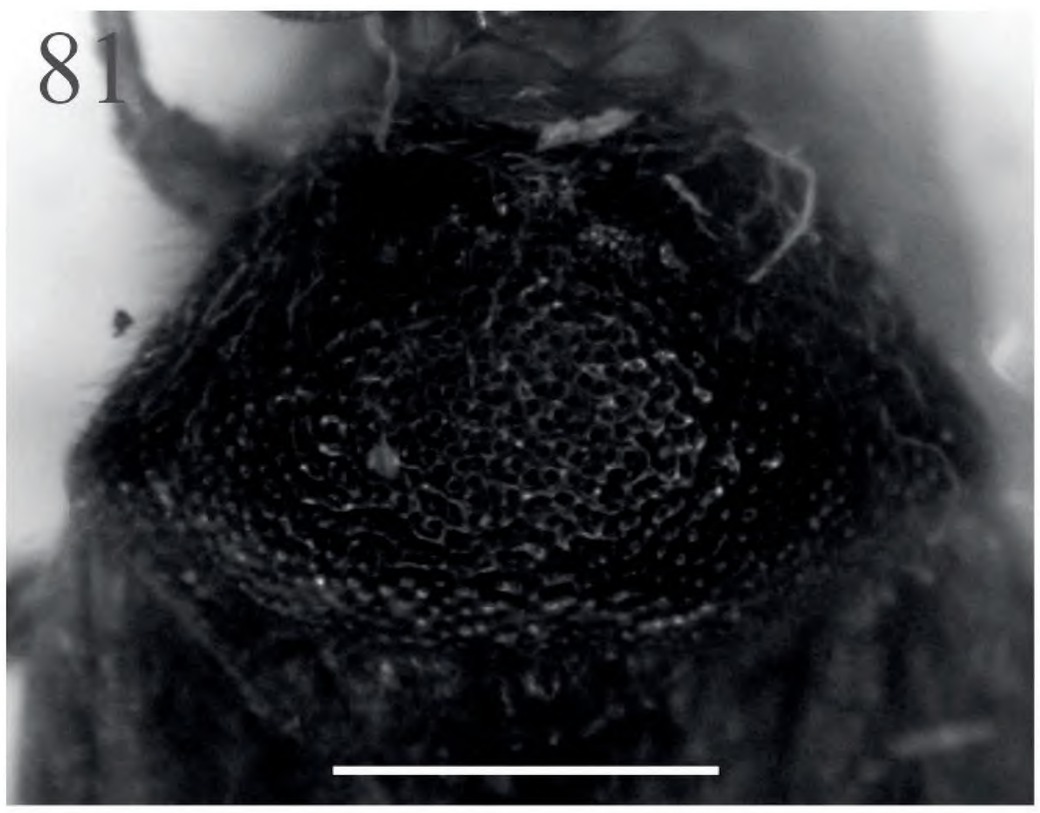
***Diognetus pilosus* (Poppius, 1914a) comb. nov.**

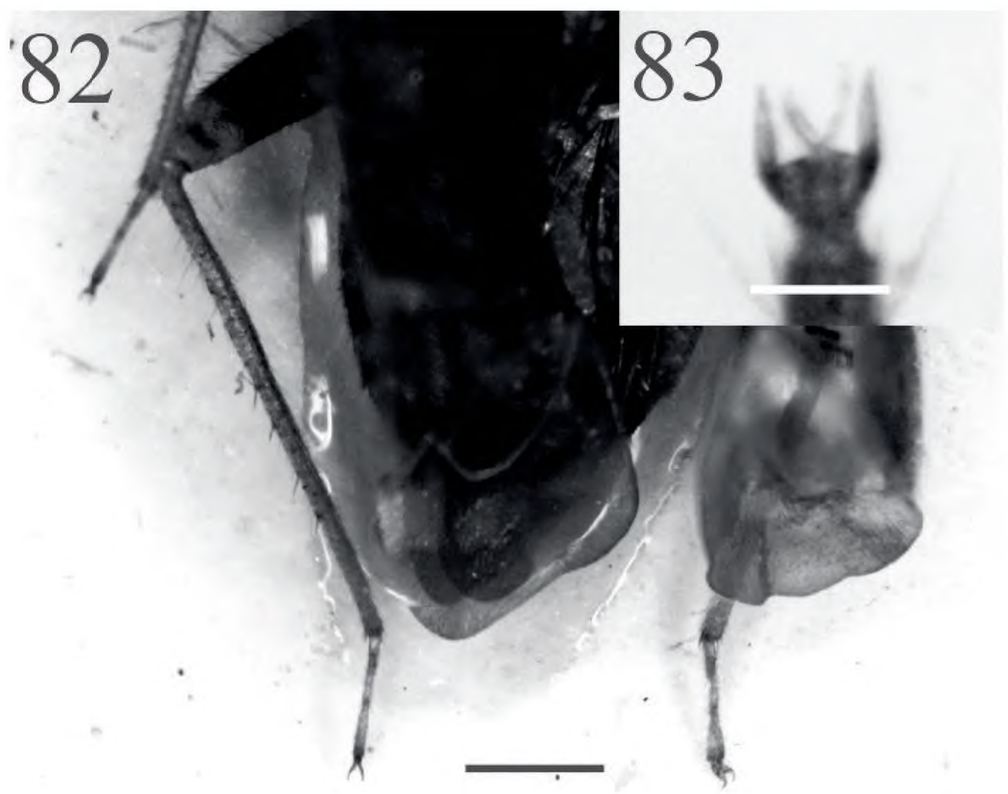
(Plate 14 fig. 10)

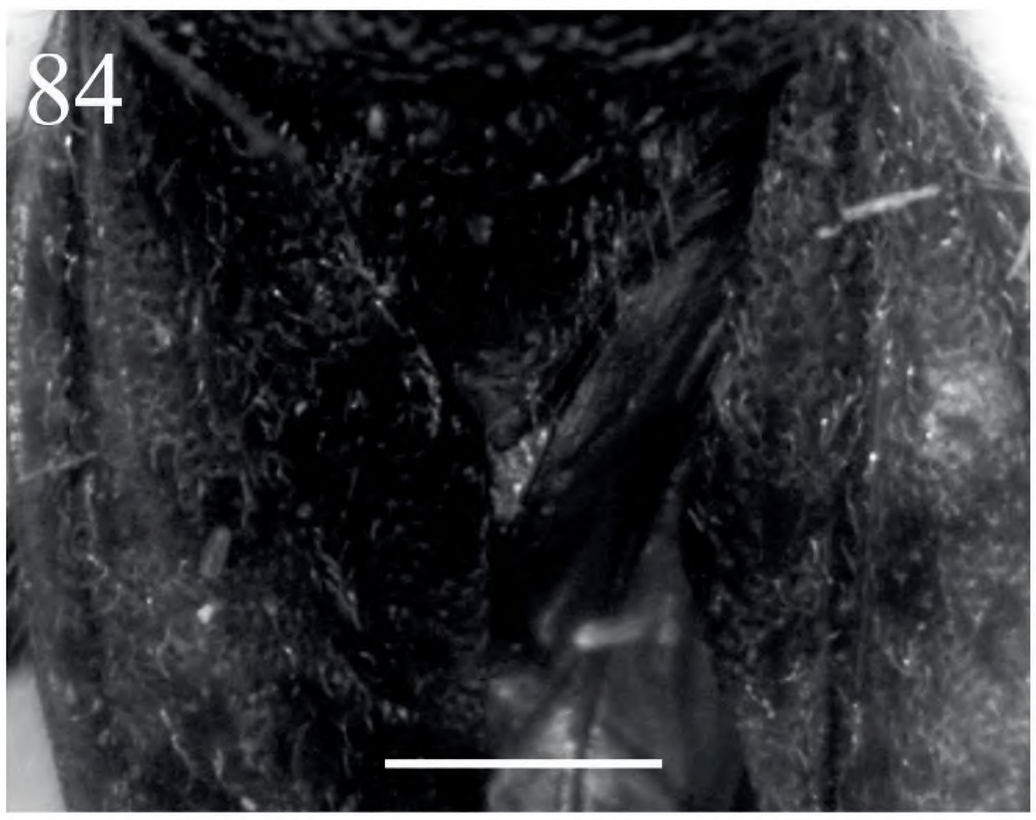
Holotype by monotypy ♀ ZMHF: Indonesia: Java: "Mus. Zool. Hels. Loan n° HE 96-31" / "Mus. Zool. H:fors. Spec. typ. n° 9977 *Gorna pilosa* Popp." / "*Gorna pilosa* gen. nov. et sp. B. Poppius Det." / "Tijnj(i)ruan, W. Java., 1400 m., Malabar geb(irge) [1700m]" (FC n° 935).







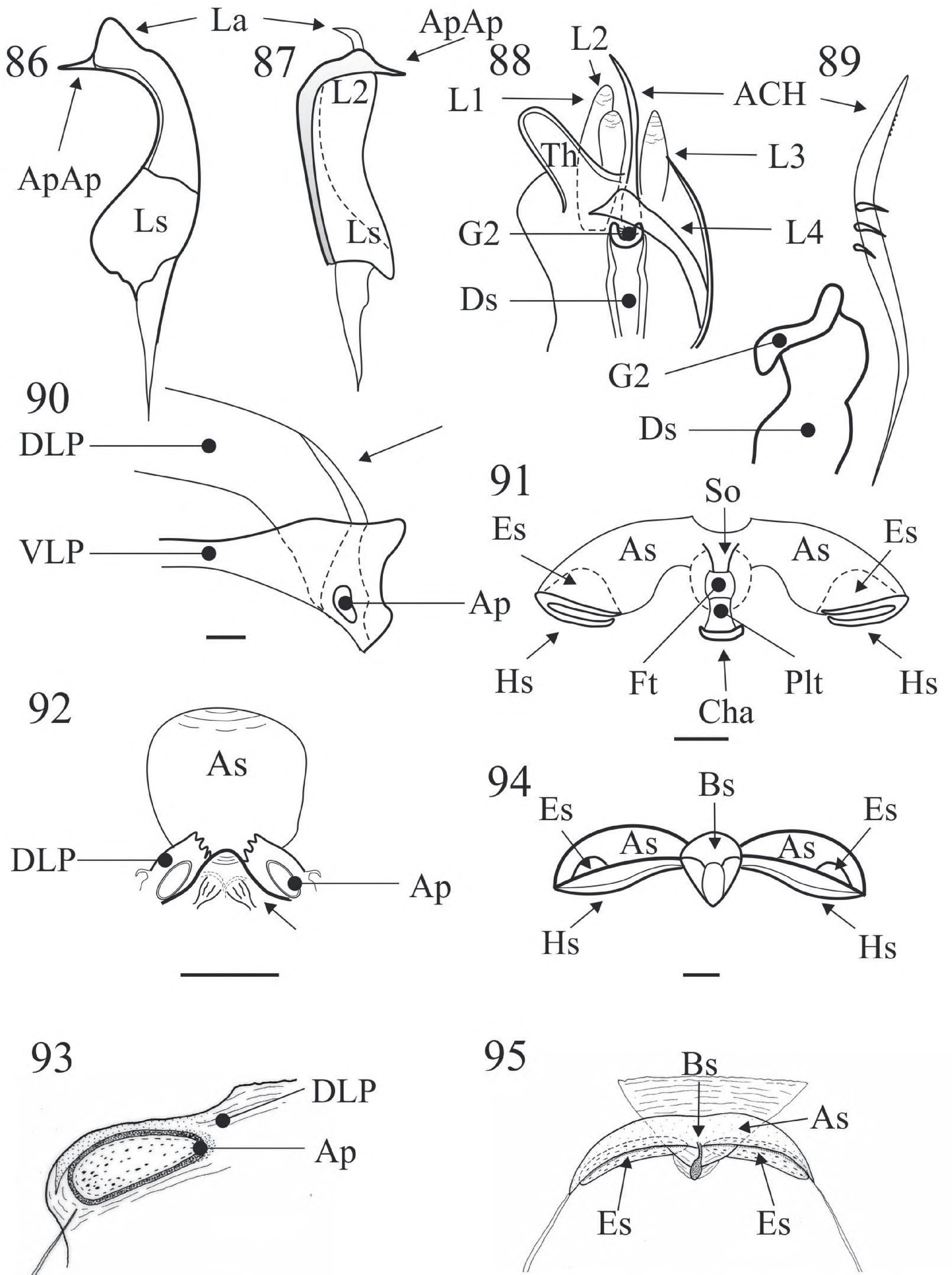






Figures 79-85. *Diognetus intonsus* Distant, 1904, ♂ FC n° 3989. 79 – Head, dorsal view; 80 – Thorax, lateral view; 81 – Pronotal surface; 82 – Left hind leg; 83 – Pretarsus and claw; 84 – Left clavus; 85 – Habitus, dorsal view. [scale bar 0.5 mm, except figs 79, 81 and 85 scale bar 1 mm].





Figures 86-95. Genital organs of Papuan Heteroptera. 86-91: *Eurystylus costalis* Stål, 1871, Genitalia of both sexes; 86. Left paramere; 87 – Right paramere; 88 – Endophallus; 89 – Detail of ACH, latero-ventral view; 90 – Parieto-vaginal rings, ventral view; 91 – Posterior wall; 92-95 – *Macrolygus rubrus* (Carvalho, 1987) and *M. viridulus* Yasunaga, 1992: ♀ genitalia (FC n° 3851 and n° 230 respectively); 92-93 – Parieto-vaginal rings; 94-95 – Posterior wall [scale bar 0.1 mm, except fig. 92 scale bar 0.5 mm].

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References: *Gorna pilosa* Poppius, 1914a: 131-132, as new species; Carvalho 1959: 96, catalogue; Schuh 1995: 760, catalogue; Schuh 2002-2013, online catalogue.
Redescription: *External anatomy*: See generic redescription. Measurements in mm (holotype female): Total length: about 5.46; width: 2.60; medial length of pronotum: 1.19; posterior width of pronotum: 2.21; vertex width: 0.41; eyes width: 0.40; length of antennal segments: I: 0.67; II: 2.24; III: broken; IV: broken; medial length of scutellum: 1.06; basal width of scutellum: 1.02; length of cuneus: 1.10; width of cuneus: 0.82.
Sexual dimorphism: Male unknown.
Female genitalia: unknown.
Discussion: *D. intonsus* was described by Poppius (1914a: 131-132) on the female holotype from Malabar gebirge, Java, Indonesia alone. The species was not recorded since its original description. *D. intonsus* could be separated from *D. pilosus* by the frons and vertex slightly curved medially with several dark patches or with a longitudinal dark brown stripe (absent in *D. pilosus*) and by the lighter dorsal colouration. The scutellum and clavii are yellow brown to red in *D. intonsus*, dark brown in *D. pilosus* (except the lighter, yellowish apex of clavii in both species), the dark brown to black patches on coria are more reduced in *D. intonsus* than in *D. pilosus*. In light of this discussion and considering the infraspecific variability as almost unknown (primarily due to absence of additional specimens from Indonesia), we maintain two nominal species in the genus *Diognetus*. The Philippine specimens seem relatively similar to *D. intonsus* but could belong to a new species. They show minor differences with Sri Lankan specimens i.e. the larger anterior dark-brown to black sub-basal transverse fascia of pronotum and the more rounded shape of the male. However, we refrain to describe it now. The genus should be reviewed on the basis of additional material and the included species accurately redefined before any description of new taxa. Specimens are available in BMNH, AMNH and USNM collections.

Eurystylus Stål, 1871

References: *Eurystylus* Stål, 1871: 671, as new genus; Zheng & Chen 1991: 197-203, revision of Chinese fauna; Schuh 1995: 766-769, catalogue; Stonedahl 1995: 135-156, review of Afrotropical species, new species, new synonymies, new combinations; Kerzhner & Josifov 1999: 99-100, catalogue; Zheng et al. 2005: 271-277, 702, redescription, in fauna; Schuh 2002-2013, online catalogue.
Type species: *Eurystylus costalis* Stål, 1871, by monotypy.

***Eurystylus costalis* Stål, 1871** (Figs 86-88, 90-91, plate 14 fig. 11)

Additional material ISNB: Papua New Guinea: Madang: 1♀: Baiteta, 05.v.1995, on *Tristiropsis acutangula* (Sapindaceae), fogging, leg. O. Missa (FC n° 4014a); 1♂, 3♀, 1?: Baiteta, 14.vii.1995, on *Neonauclea* sp. (Rubiaceae), leg. O. Missa, fogging (FC n° 4840-4842, 5067-5068); 1♂: Baiteta, 12.iv.1996, host unknown, leg. O. Missa, light trap (FC n° 4843), 2♀: Baiteta, iv.1996, host unidentified, leg. O. Missa, light trap (FC n° 4015a-4016a).

References: *Eurystylus costalis* Stål, 1871: 671, as new species; Zheng & Chen 1991: 198, redescription; Schuh 1995: 767, catalogue; Zheng et al. 2005: 273, 275-276, redescription, in fauna; Schuh 2002-2013, online catalogue.
Addition to the original description: Because only the phallic structures of *E. costalis* were shortly described in the literature, we give herafter a more detailed description of genitalia of both sexes of this species.
Description of male genitalia: Left paramere (Fig. 86) sickle-like, sensory lobe (sl) large, apex of primary apophysis (ApAp) sharp and accessory lobe (La) rounded. Right paramere (Fig. 87) very typical: inner margin translucent, including sensory and secondary lobes, primary apophysis with sharp apex and pointed, curved, accessory lobe. Endophallus (Fig. 88) with three main lobes (L1-3) and small anterior lobe (L4), ACH divided in basal and apical processes, apical process curved and laterally toothed. Ductus seminis (Ds) and secondary gonopore (G2) wide. Theca (th) wide.
Description of female genitalia: Anterior sac or seminal depository large, subdivided into two main parts, margins of glands obvious. Parieto-vaginal rings (Fig. 90) relatively small, rounded, devoid of sclerite. Dorso-labiate plate wide, margins sclerotised (reinforcement: Fig. 90, arrow). Ventral labiates plate complex. Dorsal wall membranous. Posterior wall (Fig. 91) classical. Inter-ramal sclerites or A structures (As) wide, with sclerotised dorso-lateral plates. Inter-ramal lobes or E structures (Es) rounded, pilose. Lateral lobes or H structures (Hs) present. Dorsal structure (Ds) subdivided in two parts (Cha and plt). Median process or foot (Ft) wide.
Discussion: Stål (1871: 671) described his new genus to accommodate his new species *E. costalis* from Philippines Islands. Subsequently, numerous






species were described from tropical Africa and Asia, mainly by Poppius (1911a; 1912c; 1915a & b) and Distant (1879; 1904c). Stonedahl (1995) reviewed the Afrotropical species, and synonymized a lot of old nomina. Zheng & Chen (1991) and Zheng et al. (2005) redescribed the species from China, Yasunaga et al. (2001) the species from Japan. However, the genus *Eurystylus* remains a difficult group, because the high intraspecific variability and the lack of a world scale revision, including comparative description of male and female genitalia. The specimens from Baiteta Forest could belong to *E. costalis* according to Poppius (1911a) and Zheng et al. (2005) partial keys. These specimens can be easily separated from a majority of the 19 species known from Oriental and Australian regions by their external anatomy, particularly their dark brown to black dorsal colour, their total length, the length of the first antennal segment and the shape of the second antennal segment. Only two species known from Oriental regions were not excluded on the basis of those character states: *E. costalis* and *E. montanus* Poppius, 1915a. The differences between both species are unclear to us. Phallic structures of Baiteta Forest's male specimens (Figs 88-89) are similar to the structures drawn by Zheng & Chen (1991: 198, fig. 4) and Zheng et al. (2005: 273, fig. 79g) for *E. costalis*; however the ACH sensu Chérot (2002) is slightly longer, curved and laterally toothed (all character states difficult to appreciate except for some orientations).

Apparently, *E. costalis* was described by Stål (1871: 671) on the basis of only one female specimen from Jolo, Philippines Islands. Additional specimens were recorded subsequently from numerous other countries including China (Zheng & Chen 1991; Zheng et al. 2005), Indonesia (Mantawai Archipelago and Sumatra, cf. Poppius 1911a; Java, cf. Carvalho 1959) and the United States of America (Mariana Islands, Guam and Pagan Islands cf. Carvalho 1956). The species was unknown from Papua New Guinea.

Hosts: The specimens of *Eurystylus costalis* Stål, 1871 of Baiteta Forest were recorded in four independent collection events, by fogging and light trap, on two different identified host plants: *Neonauclea* sp. (Rubiaceae) and *Tristriropsis actuangula* (Sapindaceae).

Eurystylus sp. near ***minutus*** **Poppius, 1911a**

Additional material 1♂ ISNB: Papua New Guinea: Madang: Baiteta, 01.v.1996, host unknown, leg. O. Missa, fogging (FC n° 5069).

Discussion: The sole available specimen of this small species, recorded by fogging, was teneral and consequently difficult to compare with the other Baiteta Forest's *Eurystylus* specimens. However, the parameres are relatively different, particularly the right paramere (more classical, devoid of a pointed, curved, accessory lobe).

Hosts: unknown.

Macrolygus **Yasunaga, 1992**

References: Macrolygus Yasunaga, 1992b: 48-49, as new genus; Schuh 1995: 830, catalogue; Kerzhner & Josifov in Aukema & Rieger 1999: 123, catalogue; Yasunaga et al. 2001: 71, 248-249, redescription in fauna; Zheng et al. 2005: 371-372, 689, 708, redescription, in fauna; Schuh 2002-2013, online catalogue.

Type species: *Macrolygus viridulus* Yasunaga, 1992b, by original designation and monotypy.

Macrolygus rubrus **(Carvalho, 1987)** (Figs 92-94, plate 13 figs 6-7)

Paratype ♂ MNRJ, ex BPBM: Papua New Guinea: Madang: "Simbai, Bismarck Range, 1900m., 29.v.1966, *J. L. Gressitt*" (FC n° 4259).

Additional material 1♂ & 1♀ ISNB: Papua New Guinea: Eastern Highlands: Bismarck Range, Iwam Pass, 12.v.1988, host unknown, leg. J. Van Stalle (FC n°s 3850-3851).

Other taxa examined for comparison (Plate 13 figs 8-10): *Gigantomiris jupiter* Miyamoto, Yasunaga, 1988. Japan: Honshu: 1♂ ex HUES, CFC: Okayama Pref., Mt. Kenashi, Shinjô vil., 30.v.1994. (FC n° 219); 1♀ ex HUES, CFC, leg. T. Yasunaga: Hiroshima (Prefecture), Chöjabaru, Geihoku (town), 10-11.vii.1994, light trap K. Yoshizawa leg. (FC n° 218). *Macrolygus viridulus* Yasunaga, 1992. Japan: Shikoku: 1♀ HUES: Kochi Pref(ecture), Monobe village (Kagami city), 29.viii.1993., Ex. *C. harringtonia*, *Ali & Takai* leg. (FC n° 230); Honshu: 1♂ HUES: Wakayama Pref(ecture), Hatenashi (Mountain Range), 13.vi.1996, S. Gotoh leg. (FC n° 1262) [specimens identified by T. Yasunaga]; *Miyamotoa rubicunda* Yasunaga, 1990: Japan: Ryukyus: Amami-Oshima Island: Paratype ♀ HUES: Mt. Yuwan-Dake, Uken-Son (village), B4, 03.iv.1989, Y. Takematsu leg. (FC n° 223); Paratype ♂ HUES: Mt. Yuwan-dake, 01.v.1986, Y. Notsu (FC n° 222).

References: *Waucoris rubrus*: Carvalho 1987b: 161-162, 164, as new species: description, MG; Schuh 1995: 972, catalogue; Schuh 2002-2013, online catalogue. *Macrolygus rubrus*: Chérot & Malipatil (2016: 190, 194-195), new combination.

Addition to the original description: The female genitalia of *Macrolygus* spp. were still unknown. We provide hereafter the first description









of those structures for *M. rubrus* and *M. viridulus*.
Female genitalia of *M. rubrus*. Seminal depository or anterior sac (As) elongate, membranous, lacking sclerite or ring. Parieto-vaginal rings (Fig. 92, Ap) large, totally separated; anterior margin slightly convex, outer margin convex, posterior margin almost straight, inner margins short, convex. Dorso-labiate and ventro-labiate plates unsclerotised. Dorsal wall membranous (arrow). Posterior wall (Fig. 94) elongate. Inter-ramal sclerites or A structures (As) with slightly concave dorsal margins and convex ventral and lateral margins. B structure (Bs) complex. Inter-ramal lobes or E structures (Es) rounded, relatively small, obviously separated from the B structure. Lateral plates marked. Lateral lobes or H structures elongate.
Female genitalia of *M. viridulus*. Seminal depository unknown. Parieto-vaginal rings (Fig. 93, Ap) large, totally separated; anterior margin slightly convex, outer margin convex, posterior margin almost straight, inner margins short, convex. Dorso-labiate and ventro-labiate plates unsclerotised. Posterior wall (Fig. 95) elongate. Inter-ramal sclerites or A structures (As) with concave dorsal margins and strongly convex ventral and lateral margins. B structure (Bs) reduced, devoid of posterior plate and median process (or foot). Base (or dorsal structure, Ds) subdivided in two parts. Inter-ramal lobes or E structures (Es) elongate, slightly separated from the median process. Lateral plates and lateral lobes or H structures absent.
Discussion: As already pointed out, Carvalho (1987b: 156-157) very briefly described his new genus *Waucoris* to accommodate all species described by Poppius (1915a) under the name *Adelphocoris* Reuter, 1896 from the Indo-Australian region. He compares his new genus exclusively to Reuter's genus and separates it by the absence of the phallic comb and two other minor characters (colouration of tibial spines and shape of larger areola of membrane). On the basis of these characters alone, he classifies his new species *W. rubrus* Carvalho, 1987 – described on a series of 28 type specimens from several localities of New Guinea – in the genus *Waucoris*. However, "*W.*" *rubrus* Carvalho, 1987 is obviously neither congeneric with *Waucoris keyensis* (Poppius, 1915a), the type species of the genus, nor with the related species *Waucoris papuanus* (Poppius, 1915a) and *Waucoris wauensis* Carvalho, 1987b. "*W.*" *rubrus* Carvalho, 1987 is even lacking one of the main characters of the *Adelphocoris* – *Creontiades* Distant, 1883 – *Megacoelum* Fieber, 1858 complex of genera (cf. Chérot et al. 1999; Chérot & Malipatil 2016), of which the true *Waucoris* are members. The two last antennal segments of "*W.*" *rubrus* are narrower than the second (versus almost of the same width in *Adelphocoris* – *Creontiades* – *Megacoelum* complex of genera).
On the other hand, "*W.*" *rubrus* agrees with original description of *Macrolygus* by Yasunaga (1992b: 48-49) in virtually all major characters, i.e.:

1 The elongate (more in the males than in the female), relatively wide (more in the female) [12] body, covered with small, recumbent, fine, white pubescence;
2 The eyes contiguous to the narrow pronotal collar;
3 The vertex weakly sulcate longitudinally (the sulcus almost absent in female), its base slightly marginate laterally;
4 The first antennal segment slightly curved, relatively stout and short in the female, about as long as width of head, as on Yasunaga's (op. cit.: 49) fig. 3 (a female), linear, longer and narrower in the male (as in Carvalho's fig. 20, 1987, p. 162, a male);
5 The second antennal segment almost linear, the following segments slender;
6 The hemelytra shallowly punctate (as the pronotum and scutellum), uniformly covered by the white, recumbent pubescence and
7 The fore tibia widened distally.

If the male genitalia of "*W.*" *rubrus*, and particularly the endophallus, are more complex than those of *Macrolygus viridulus* Yasunaga, 1992, two important characters are similar: the secondary gonopore is proportionally very wide and provide with a gonoporal process (cf. Carvalho 1987b: 162, fig. 21 and Yasunaga 1992b: 50, fig. 4D).
"*W.*" *rubrus* cannot be easily classified in any of the other Mirini genera of the world with a narrow and shallow dorsal punctation. "*W.*" *rubrus* is neither member of *Adelphocoris* - *Creontiades* - *Megacoelum* complex of genera, nor member of *Phytocoris* Fallén, 1814 complex of genera (cf. Stonedahl 1988a; Chérot 1997b) or of *Calocoris* Fieber, 1858 complex of genera (sensu Rosenzweig 1997). From the first, "*W.*" *rubrus* is separated by the antennal structure, from the second, "*W.*" *rubrus* is separated by the classical metafemoral structure

12 Yasunaga's comparison between *Macrolygus* and *Lygocoris* (Yasunaga, 1992b: 49) is difficult to understand when the specimen analysed is a female, because *M. viridulus* Yasunaga, 1992 female is a large bug. However, the habitus of several males are more *Lygocoris*-like.





(not *Phytocoris*-like i.e. not flattened and not basally sulcate) and from the third, by the pilosity and male genitalia. According to Rosenzweig (op. cit.: 140), the "*Calocoris* complex", maybe a polyphyletic group, including five "sub-" complexes (also termed "complex" by him) [13]:

1 The *Closterotomus* Fieber, 1858 complex (characterised by a mixed pubescence and an abundant vesical armament);
2 The *Polymerias* Yasunaga, 1997 complex (characterised by the silky, silvery recumbent dorsal pubescence and by the totally black colouration);
3 The *Thiomiris* Rosenzweig, 1997 complex (characterised by the golden, fine pubescence and by the totally yellow colouration);
4 The *Calocoris* complex *stricto*-sensu (characterised by the endophallus with 6 lobes lacking sclerites but provided with denticles fields), and
5 The *Rhabdomiris* Wagner, 1968 complex (characterised mainly by the colouration of the veins – margined with black – and the large ACH).

"*W.*" *rubrus* does not fit any of these groups.
Due to its colouration and large size, "*W.*" *rubrus* could be compared to *Gigantomiris* Miyamoto, Yasunaga, 1988 and *Miyamotoa* Yasunaga, 1990. From *Miyamotoa*, "*W.*" *rubrus* can be separated by the shape of second antennal segment (linear in "*W.*" *rubrus*, apically club-like in *Miyamotoa*) and by the hemelytral pubescence (simple, fine, white, recumbent in "*W.*" *rubrus*, double, the first silky, recumbent, fine, white and the second stiff, suberect, black in *Miyamotoa*). From *Gigantomiris*, "*W.*" *rubrus* can be separated by the venation (the median vein is reduced in *Gigantomiris*) and by the hemelytral pubescence (black, sparse, suberect in *Gigantomiris*). The species of African genus *Pleurochilophorus* Reuter, 1905 possess a gonoporal sclerite. However, the shape of this sclerite is totally different from the comb of "*W.*" *rubrus* or from the tiny ribbon-like sclerites of *M. viridulus*. Moreover, *Pleurochilophorus* could be classified in *Adelphocoris – Creontiades – Megacoelum* complex by the width of the two last antennal segments, by the large sulcus of vertex etc.
Consequently, Chérot & Malipatil (2016) suggested the new combination *Macrolygus rubrus* (Carvalho, 1987b). However, T. Yasunaga (pers. comm. to the first author) considers that the similarities between *M. viridulus* and "*W.*" *rubrus* could be just homoplasy and the genus *Macrolygus* as east Palaearctic element, living exclusively on several conifers, including *Cephalotaxus*. We are reluctant to describe a new genus for *W. rubrus* in the present state of our knowledge and maintain it in *Macrolygus* until additional clarifications of Mirini classification and phylogeny.
Obviously, the three species presently classified in the genus *Macrolygus* can be easily separated by the hemelytral colouration and by the male genitalia. We provide hereafter a key of these species.

Key to species of *Macrolygus* Yasunaga, 1992

1 Hemelytral colouration red, head, antennae, legs, membrane and apex of cunei, dark brown to black. Endophallus complex, including one ACH, one comb-like gonoporal process and one "lobe sclerite" sensu Kelton (1959) ..... *M. rubrus* (Carvalho, 1987)
– Hemelytral colouration and endophallus different .. 2
2 Hemelytral colouration green or yellow on dried faded specimens in the collections. Species dorsally green except for the brown membrane, and the exocoria, some parts of the legs and some parts of antennal segments, which are yellow. Endophallus with one very small and elongate gonoporal sclerite ..... *M. viridulus* Yasunaga, 1992
– Hemelytral colouration green to red-brown. Endophallus with an ACH, devoid of gonoporal sclerite ..... *M. torreyae* Zheng in Zheng et Lu, 2002

Hosts: Unknown. *M. viridulus* was recorded from *Chamaecyparis harringtonia* (Cupressaceae, unpublished data) and was sometimes attracted to the light (Yasunaga 1992b). *M. torreyae* was recorded from *Torreya grandis* (Taxaceae) (Zheng & Lu 2002).
Note: this species was not recorded from Baiteta Forest.

Prolygus Carvalho, 1987

References: *Prolygus* Carvalho, 1987c: 137-138, as new genus; Schuh 1995: 941, catalogue; Kerzhner & Josifov 1999: 172-173, catalogue; Zheng et al. 2005: 560-565, redescription, in fauna; Schuh 2002-2013, online catalogue.
Type species: *Lygus papuanus* Poppius, 1914b, by original designation.

***Prolygus ehannoi* sp. nov.** (Figs 96-109, plate 14 figs 1-3)

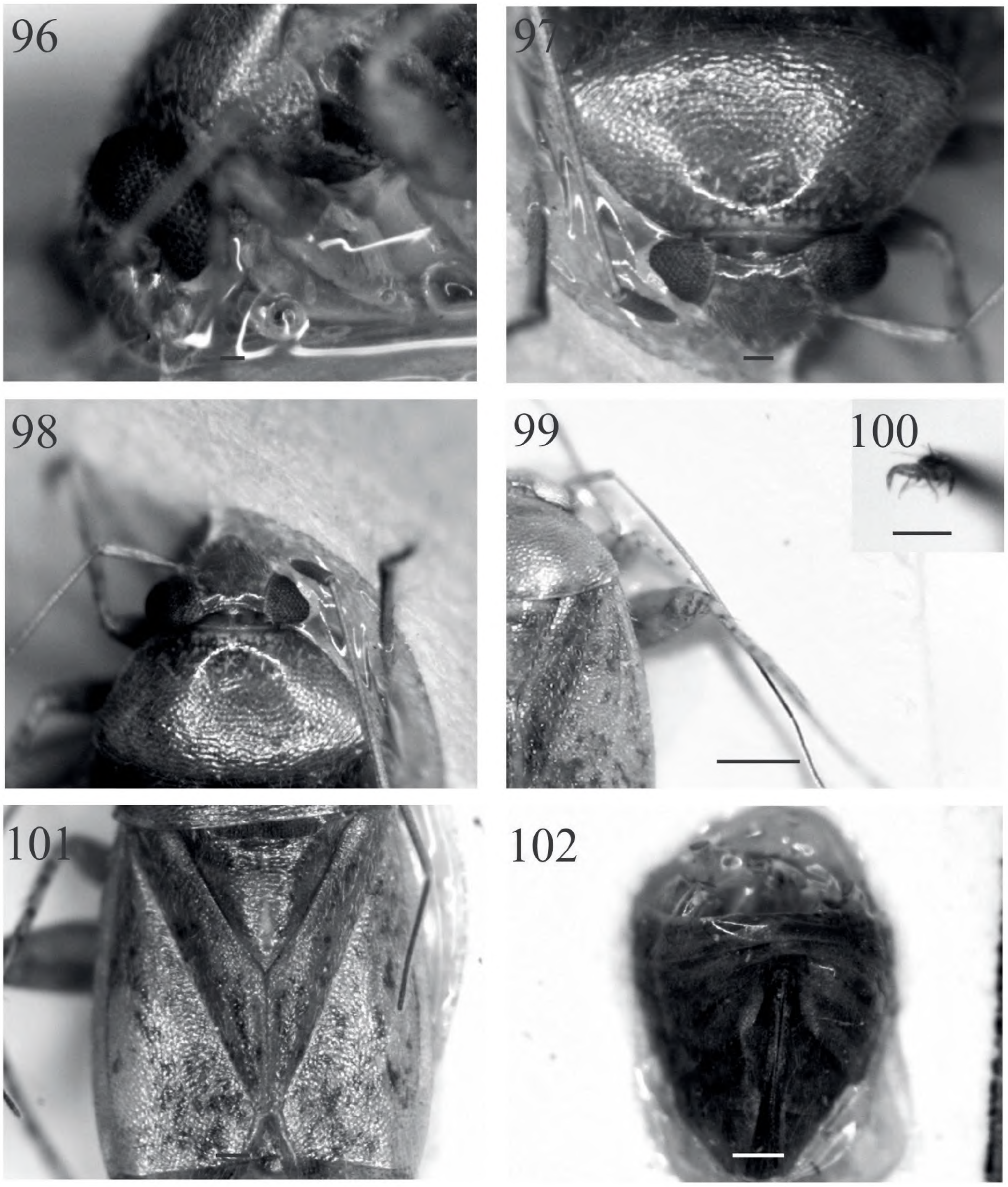
Holotype ♂ ISNB: Papua New Guinea: Madang: "*Prolygus ehannoi* sp. nov. FC n°4021. Det. F. Chérot, 2011" / "Holotype *Prolygus ehannoi* Chérot, Gorczyca,

13 Similar subdivisions are suggested in Rosenzweig's (2001) more general classification of Palaeartic genera of "Miraria" and challenged by Chérot (2002).






Schwartz & Demol" / "Coll. I.R.Sc.N.B., Canopy Mission Papua New Guinea, (Madang prov.): Baiteta 03.vi.1996, light trap AR16 [the code AR16 corresponds to *Celtis philippinensis* (Ulmaceae)], leg. O. Missa" (FC n° 4021). Paratypes ISNB: 1♀: Baiteta, 16.iii.1993, O. Missa leg., on *Dracontomelum dao* (Anacardiaceae), light trap (FC n° 4027); 1♂, 3♀: Baiteta, 26.iii.1993, O. Missa leg., on *Pometia pinnata*, light trap (FC n°s 4015-4017, 4019); 1♂: Baiteta, 20.v.1993, O. Missa leg., on *Pometia pinnata* (Sapindaceae), light trap (FC n° 4014); 2♂ & 1♀: Baiteta, 24.iv.1996, O. Missa leg., on *Chisocheton ceramicus* (Meliaceae), light trap (FC n°s 4018, 4022, 4025); 11♂: Baiteta, 10.vi.1996, O. Missa leg., on *Buchaniana heterophylla* (Anacardiaceae), light



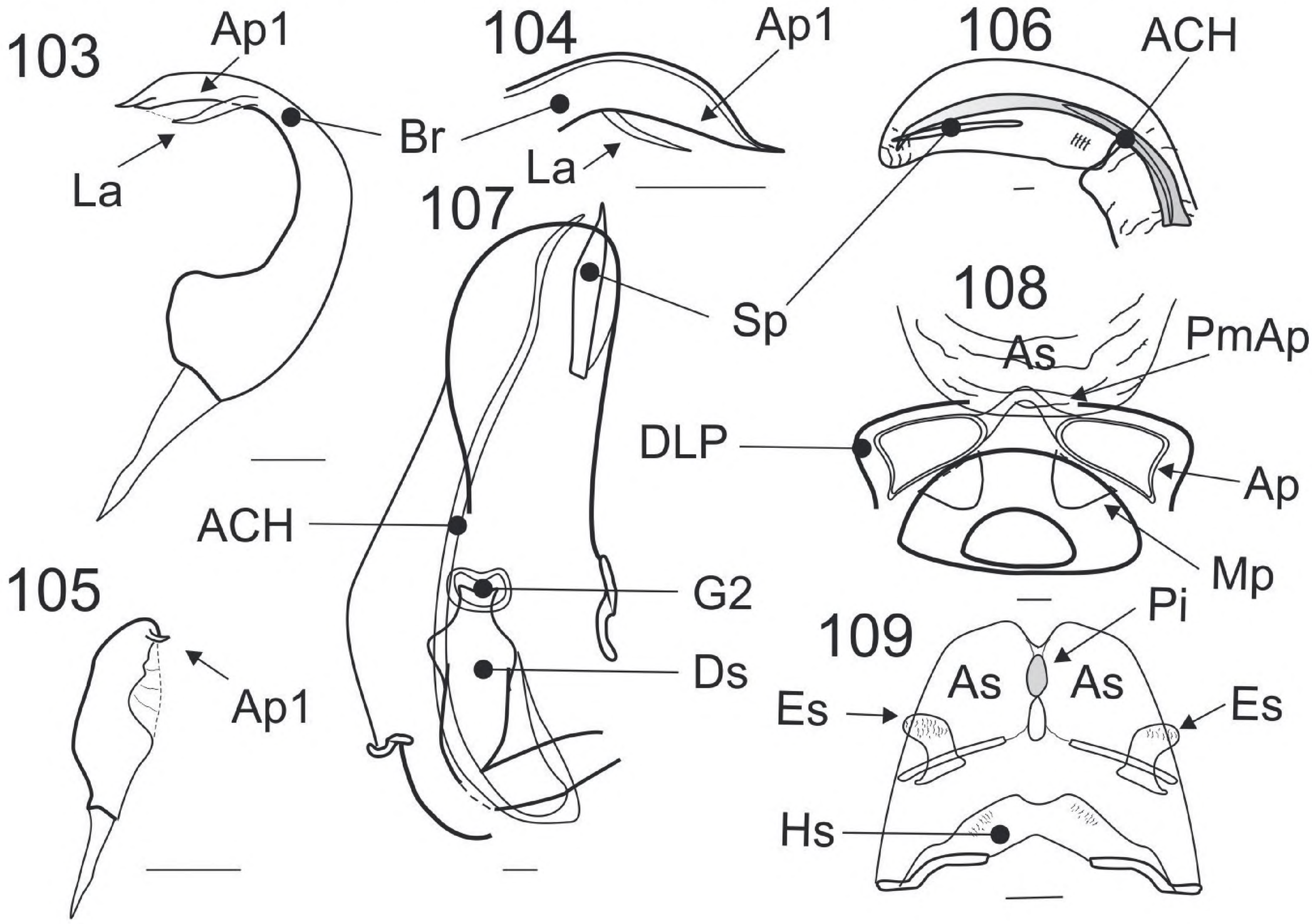
Figures 96-102. *Prolygus ehannoi* sp. nov., female paratype FC n°4027. 96 – Head, lateral view; 97 – Head, dorsal view; 98 – Pronotal surface; 99 – Metafemur; 100 – Claw; 101 – Clavii and coria; 102 – Abdomen, ventral view [scale bar 0.1 mm, except fig. 100 scale bar 0.05 mm and fig. 102 scale bar 0.5 mm].



trap (FC n° 4020); 1♂: Baiteta, 01.vii.1996, O. Missa leg., on *Buchaniana heterophylla* (Anacardiaceae), light trap (FC n° 4023).

Derivatio nominis: The new species is dedicated to our French colleague the late Bernard Ehanno for his accurate and very detailed works about the genus *Dimorphocoris* (Halticini) and about female genitalia of Miridae.

Description: Body rounded, relatively wide, stout, total length in female: 3.58-3.92 (n =5), total length in males: 3.63-3.77 (n = 6); maximal width of hemelytra (after apex of clavus) in males: 1.67-1.86 (n = 6), maximal width of hemelytra (after apex of clavus) in females: 1.76-1.91 (n = 5). Dorsal colouration in collection yellow green to light brown with numerous red brown patches on hemelytra (Fig. 101, plate 14 figs 1-3). Head. Clypeus yellow, not covered by frons in dorsal view, with short suberect setae. Maxillary and mandibular plates uncarinate, lacking tubercle, yellow brown with red to pinkish spots. Frons yellow, slightly rounded, with very short, recumbent or suberect, white setae, without sericeous or woolly setae (Fig. 98). Eyes glabrous, silvery, occupying about 75 percent of height of head in lateral view. Total width of diatone in males: 0.88-1.00 (n = 6), in females: 0.88-0.93 (n = 5), width of vertex in males: 0.29-0.34 (n = 6), in females: 0.29-0.39 (n = 5). Vertex obviously carinate, slightly depressed medially. Antenna elongate. First and second segments yellow, third and fourth black, except for a very narrow yellow ring. Lengths of joints in males: 0.37-0.49 (n = 6), 1.37-1.47 (n = 6), 0.64-0.74 (n = 6), 0.54-0.61 (n = 4). Lengths of joints in females: 0.37-0.42 (n = 5), 1.30-1.52 (n = 5), 0.71-0.78 (n = 5), 0.54-0.61 (n = 5). Labium yellow, with red lines, extending slightly beyond the metacoxa. Thorax. Pronotum (Fig. 98). Total length in males (collar included): 0.75-0.87 (n = 6). Total length in females (collar included): 0.77-0.83 (n = 5). Posterior width in males: 1.42-1.52 (n = 6). Posterior width in females: 1.37-1.62 (n = 5). Collar narrow, yellow brownish. Callosities reduced, hardly visible, separated medially and from the lateral margins of disk. Pronotal disk yellow brown, punctation relatively narrow but deep, dense. Mesoscutum sometimes totally covered, frequently at least partially uncovered. Scutellum



Figures 103-109. *Prolygus ehannoi* sp. nov., genitalia of both sexes. 103 – Left paramere; 104 – Primary apophysis of the left parameres, ventral view; 105 – Right parameres; 106-107 – Endophallus, ♂ paratype FC n° 4018; 108 – Parieto-vaginal rings, dorsal view; 109 – Posterior wall, ♀ paratype FC n° 4019 [scale bar 0.1 mm].



(Fig. 101). Length in males (mesoscutum excluded): 0.54-0.64 (n = 6), length in females (mesoscutum excluded): 0.51-0.80 (n = 5). Basal width in males: 0.47-0.81 (n = 6), basal width in females: 0.49-0.76. Surface yellow brown, sometimes with red brown patches, striate; pilosity white, adpressed to suberect; punctation narrow and deep, the lateral margins straight. Legs (Fig. 99). Femora yellow-brown, with several red to pinkish rings apically. Metatibia with suberect, yellowish setae and yellowish to brownish spines, arising from wide dark red to brown point. Tarsi yellow, with base and apex orange-brown. Claws (Fig. 100). Hemelytra (Fig. 101). Clavus and corium opaque, yellow-brown, with dense, shallow and narrow punctation and numerous red brown to brown patches, particularly on the endocorium. Pilosity adpressed, white, without sericeous or woolly setae. Cuneus yellow-brown, apex with black. Length of cuneus in males: 0.64-0.76 (n = 6), length of cuneus in females: 0.60-0.69 (n = 5). Width of cuneus in males: 0.39-0.56 (n = 6), width of cuneus in females: 0.39-0.54 (n = 5). Membrane glassy, brownish with yellowish areas, veins yellowish. Abdomen (Fig. 102): yellowish with long white setae and red to pinkish patches.

Male genitalia: Left paramere (Figs 103-104) sickle-like with wide sensory lobe, pointed primary apophysis (Ap1) slightly curved apically and acute accessory lobe (LA). Right paramere (Fig. 105) stout with short, curved, primary apophysis. Endophallus (Figs 106-107) with large secondary gonopore (Fig. 107, G2), elongate, convoluted ACH and elongate apical spiculum (Sp).

Female genitalia: Anterior sac (SA) classical, apparently lacking sclerite or glandular ring. Dorsal wall (Fig. 108) complex, including large posterior sac. Pair of subtriangular toothed medial processes (MP) projecting into genitalic chamber, apparently arising from reinforced part of lateral roof of chamber, partially hidden in dorsal view by dorsal wall. Lateral oviducts totally separated, short and relatively narrow. Parieto-vaginal rings (Fig. 108) large, anterior and latero-inner margins slightly convex, posterior and latero-outer margins sigmoid. Rings separated by distance slightly greater than maximal length, linked by curved medial plate (PmAp). Dorso-labiate plate slightly sclerotised. Posterior wall (Fig. 109) large. Inter-ramal sclerites or A structures (AS) with obviously convex dorsal margins and lateral margins and slightly concave ventral margins. Inter-ramal lobes from E structures (ES) elongate, *Apolygus*-like, arising from reinforcement – or lateral plate – of inter-ramal sclerite ventral margin, obviously separated of B structure. Membranous area separates interramal and lateral lobes. Lateral lobes or H structures (HS) wide, elongate and convoluted.

Discussion: The generic placement of these typical bugs belonging to *Lygus* complex is problematic. Numerous genera of the complex remain poorly defined. Carvalho (1987c: 138) briefly described the genus *Prolygus*, based mainly on not diagnostic character states and compars it only to few genera of the complex. As pointed out by Schwartz & Kerzhner (1997: 255), character states of the left paramere and sclerotised rings "do not allow unequivocal generic placement". *Prolygus* should be carefully reviewed. However, we were not able to classify our specimens in another genus of the complex. The measurements, the head structure, the dorsal colouration and pilosity, the spines of metatibia, yellow to red, arising from wide dark point (as it is the case in several Papuan *Prolygus*, *contra* Yasunaga et al. 2002 key) and the male genitalia seem to exclude their membership to the numerous other genera of the complex. The very typical female genitalia seem species-specific. Although structurally similar to the structures of *P. polhemusorum* sp. nov., the female genitalia of *P. ehannoi* sp. nov. differs by the shape of parieto-vaginal rings, by the shape of the sclerites of the dorsal wall, by the shape of the inter-ramal sclerites and by the shape of the lateral lobes of the posterior wall etc. The new species is easily separated from the Papuan *Prolygus* species by its dorsal colouration (yellow green with numerous red brown patches) and by the male and female genitalia.

Hosts: In Baiteta Forest, 12 specimens of *P. ehannoi* were recorded in 7 independent collection events, only by light traps, from *Buchaniana heterophylla* (Anacardiaceae), *Celtis philippinensis* (Ulmaceae), *Chisocheton ceramicus* (Meliaceae), *Dracontomelum dao* (Anacardiaceae) and *Pometia pinnata* (Sapindaceae).

***Prolygus erimensis* (Poppius, 1914b)** (Figs 110-116, 138-139, plate 17 figs 1-2)

Lectotype ♀ HNHM, designation by Carvalho, 1987c: 142: Papua New Guinea: Madang: "Astrolabe Bai, Erima, 1898, Biro" (FC n° 5064) (HNHM).

Additional material 1♀ ISNB: Papua New Guinea: Madang: Baiteta, 08.iv.1996, O. Missa leg., on *Chisocheton ceramicus* (Meliaceae), light trap (FC n° 4068).

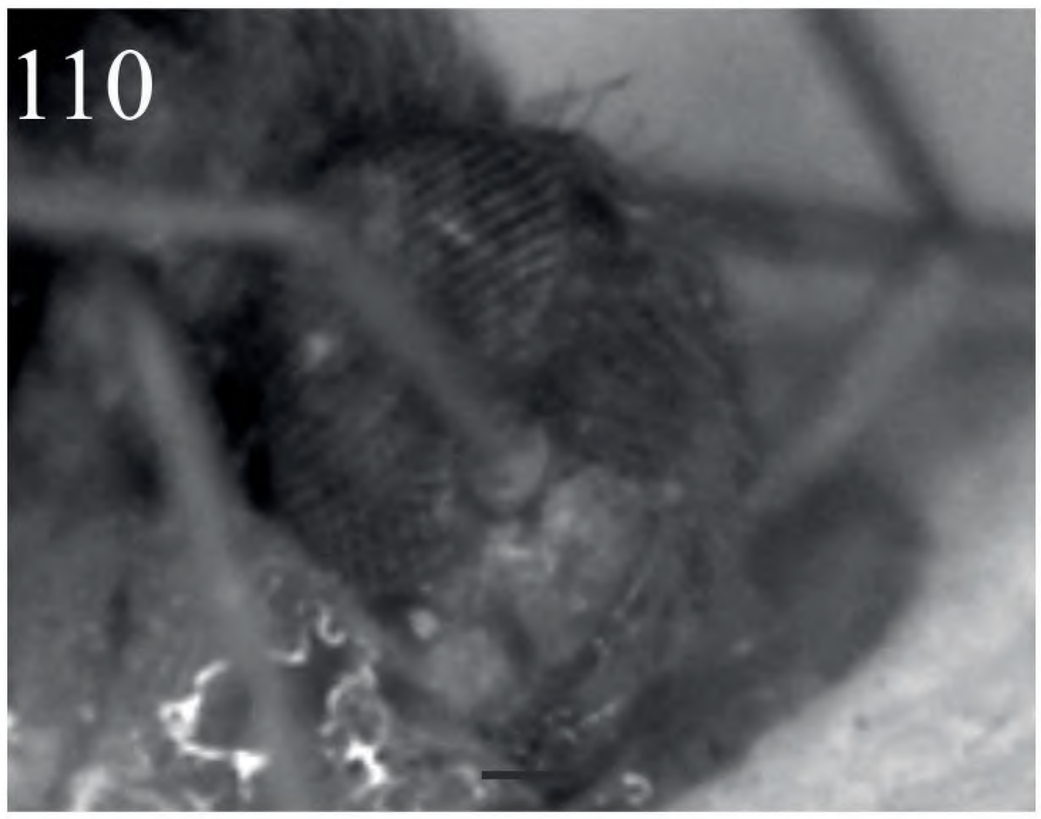
References: *Lygus erimensis* Poppius, 1914b: 370, as new species; *Prolygus erimensis*: Carvalho

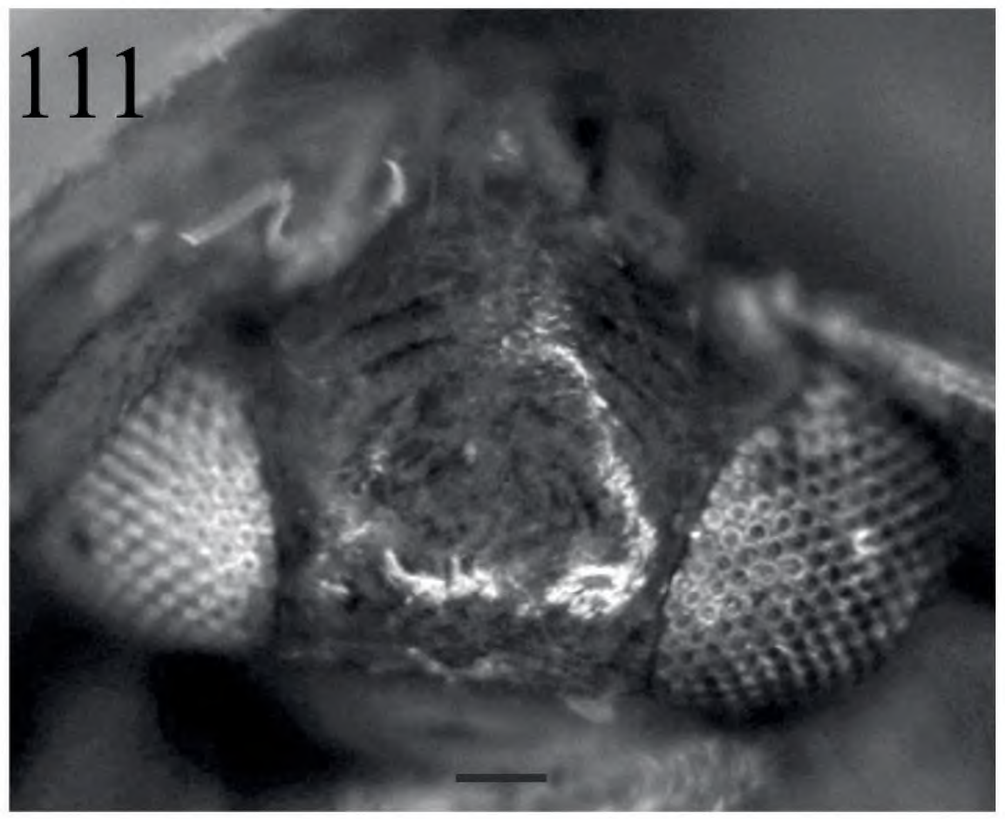


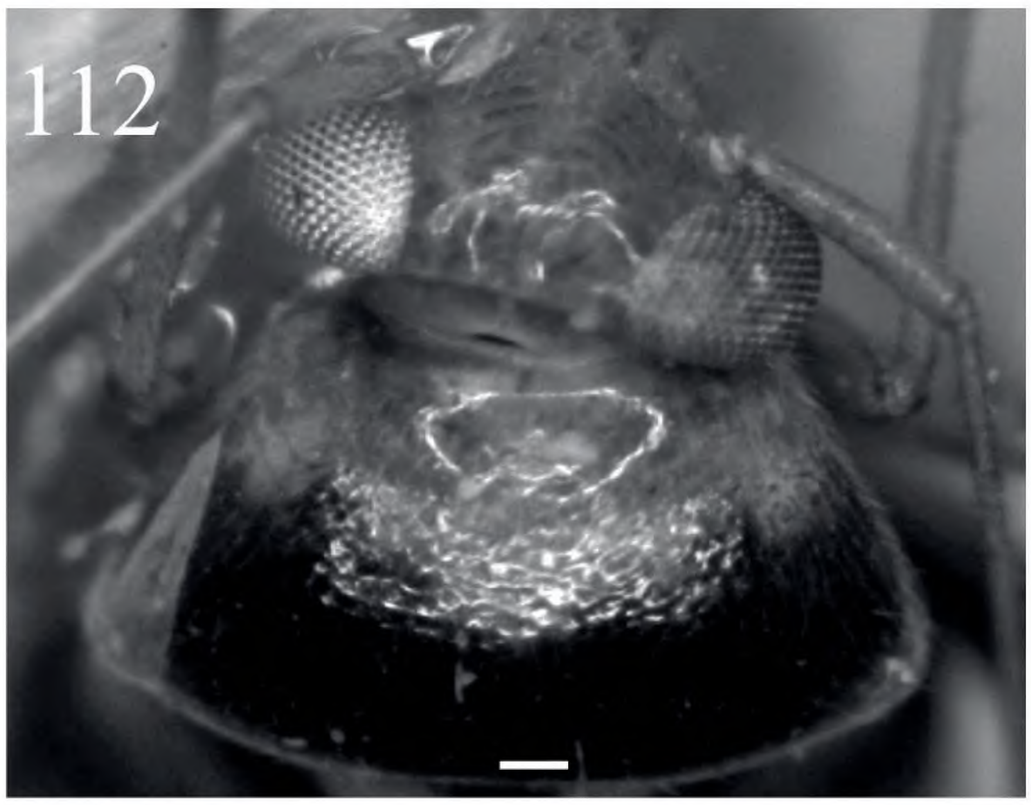


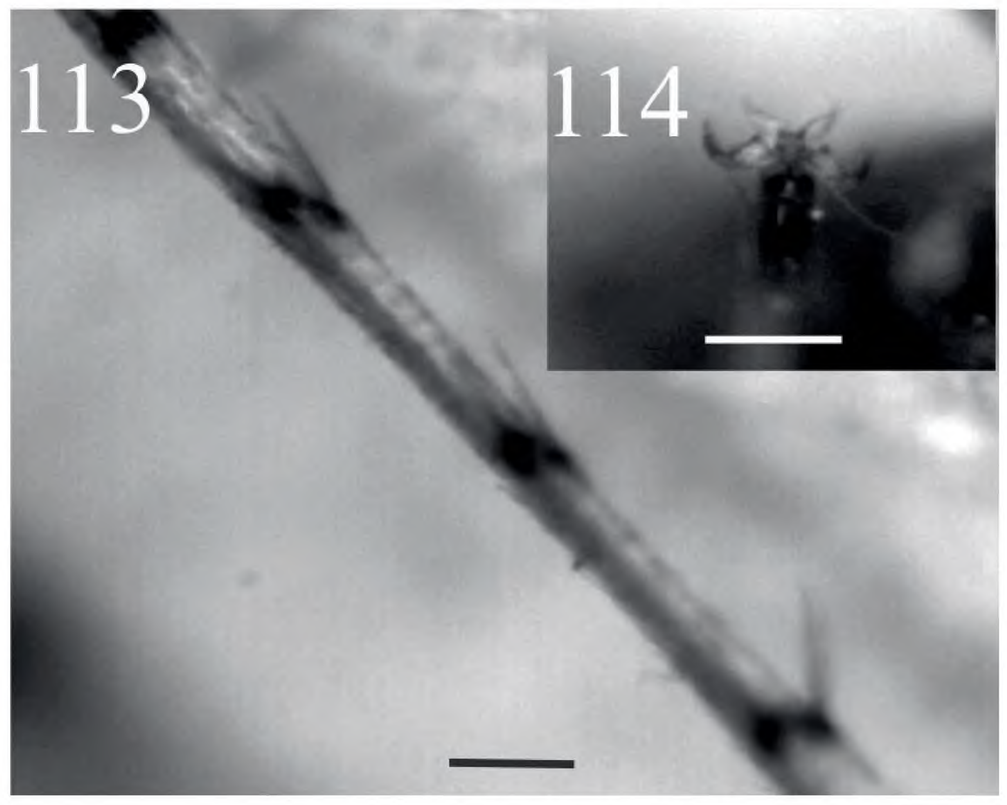

1987c: 139, 142, redescription, habitus, new combination; Schuh 1995: 941, catalogue; Schuh 2002-2013, online catalogue.

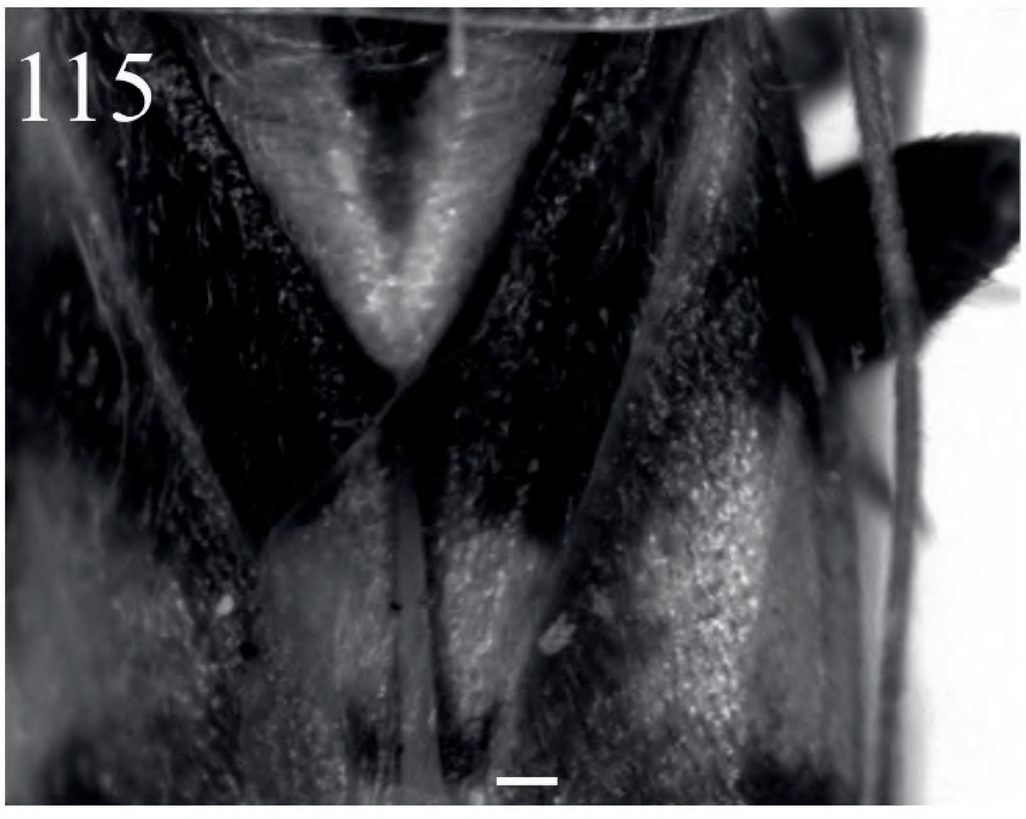
Addition to the original description: The female genitalia of *Prolygus erimensis* were unknown still. Unfortunately, the abdomen of the Baiteta specimen is in poor condition and we can just provide some reduced information about the genitalia. Dorsal sac and posterior wall unknown. Lateral oviducts wide and particularly elongate. Dorsal labiate plate slightly sclerotised on margins, posterior margin curved. Parieto-vaginal rings (Fig. 138) reduced, their shape classical: anterior margin convex, posterior margin almost straight. Posterior

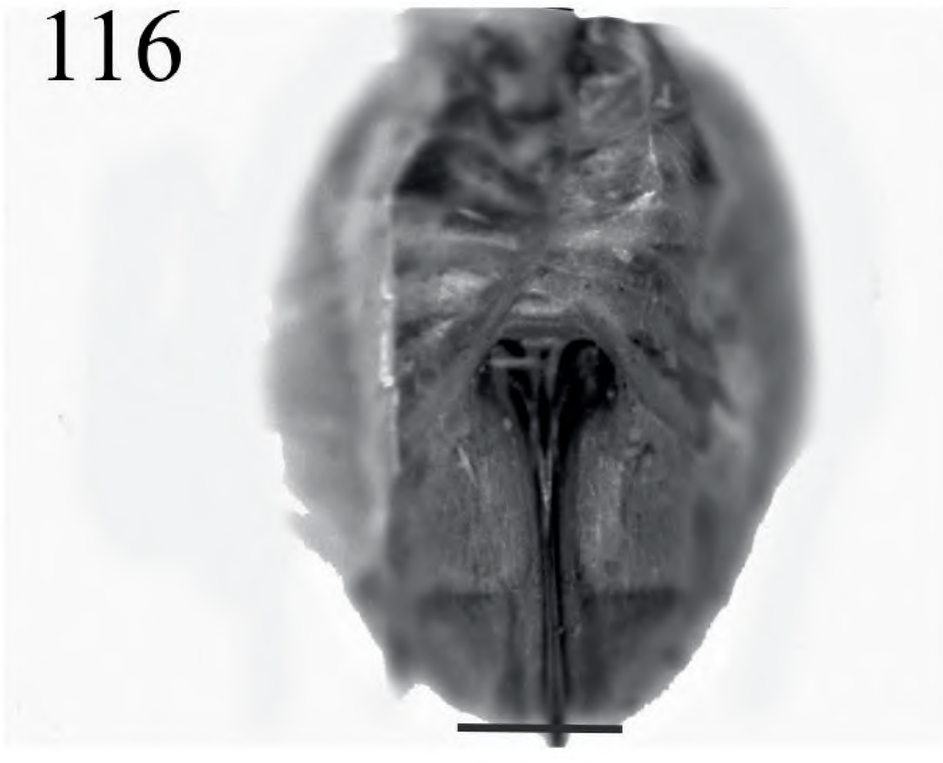












Figures 110-116. *Prolygus erimensis* (Poppius, 1914b), female FC n° 4068; 110 – Head, lateral view; 111 – ditto, dorsal view; 112 – Pronotal surface; 113 – Metatibia; 114 – Pretarsus and claw; 115 – Clavii and anterior parts of coria; 116 – Abdomen, ventral view [scale bar 0.1 mm, except fig. 116 scale bar 0.5 mm].









wall (Fig. 139) with relatively complex B structure and small E structures. H structure absent.

Discussion: *Prolygus erimensis* (Poppius, 1914) was described on the basis of two female specimens: the lectotype from Astrolabe Bai, Madang Province, Papua New Guinea and a paralectotype from Sattelberg, Huon Gulf, Morobe Province, Papua New Guinea. Carvalho (1987c: 142) mentions additional specimens, all females, from Papua Barat, Indonesia (Warris) and from Papua New Guinea (Kassam, 48 km E. of Kainantu, Eastern Highlands; Maprik, East Sepik and Goroka, Eastern Highlands).

Hosts: In Baiteta Forest, *P. erimensis* (Poppius, 1914) was recorded once, by light trap, on *Chisocheton ceramicus*.

Prolygus cf. ***femoralis*** **Poppius, 1914b** (Figs 117-123, 140-144, pllate 17 fig. 3)

Additional material: Papua New Guinea: Madang: 2♀ ISNB: Baiteta, 16.iii.1993, O. Missa leg., on *Dracontomelum dao* (Anacardiaceae), light trap (FC n°s 4032, 5137); 1♀ ISNB: Baiteta, 19.iii.1993, O. Missa leg., on *Pometia pinnata* (Sapindaceae), light trap (FC n° 4034); 1♀ ISNB: Baiteta, 26.iii.1993, O. Missa leg., on *Pometia pinnata* (Sapindaceae), light trap (FC n° 4036); 1♂ & 4♀ ISNB: Baiteta, 20.v.1993, O. Missa leg., on *Pometia pinnata* (Sapindaceae), light trap (FC n°s 4035, 4040, 4044, 4047, 4050); 2♂ & 1♀ ISNB: Baiteta, 05.v.1995, O. Missa leg., on *Tristiropsis acutangula* (Sapindaceae), fogging (FC n°s 4030, 4041-4042); 1♀ ISNB: Baiteta, 1995, O. Missa leg., on *Celtis latifolia* (Ulmaceae) + *Planchonella* sp. (Sapotaceae), fogging (FC n° 4045); 1♂ ISNB: Baiteta, 09.iv.1996, O. Missa leg., on *Chisocheton ceramicus* (Meliaceae), light trap (FC n° 4024); 1♀ ISNB: Baiteta, 09.iv.1996, O. Missa leg., on *Terminalia sepikana* (Combretaceae), light trap (FC n° 4037); 1? ISNB: Baiteta, 09.iv.1996, O. Missa leg., on *Celtis philippinensis* (Ulmaceae), light trap (FC n° 4033); 2♀ ISNB: Baiteta, 13.iv.1996, O. Missa leg., on *Dysoxylum arnoldianum* (Meliaceae) + *Homalium foetidum* (Flacourtiaceae), light trap (FC n° 4038-4039); 1? ISNB: Baiteta, 13.iv.1996, O. Missa leg., on *Celtis philippinensis* (Ulmaceae), fogging (FC n° 4052); 1♂ ISNB: Baiteta, 15.iv.1996, O. Missa leg., on *Terminalia sepikana* (Combretaceae) + *Piteleocarpus indicum* (Fabaceae), light trap (FC n° 4051); 3♀ ISNB: Baiteta, 24.iv.1996, O. Missa leg., on *Chisocheton ceramicus* (Melicaceae), light trap (FC n°s 4028, 4043, 4046); 2♀ & 1? ISNB: Baiteta, ?.iv.1996, O. Missa leg., host unknown, light trap (FC n°s 4026, 4029, 4049).

References: *Lygus femoralis* Poppius, 1914b: 376-377, as new species; *Prolygus femoralis*: Carvalho 1987c: 142-143, redescription, MG, synonymy, new combination; Schuh 1995: 941, catalogue; Schuh 2002-2013, online catalogue.

Discussion: *Prolygus femoralis* was described by Poppius (1914b: 376-377) on the female holotype from Sattelberg, Huon Gulf alone. A few additional specimens from Morobe District and New Ireland, Papua New Guinea, were cited by Carvalho (1987c). Unfortunately, neither Poppius' nor Carvalho's descriptions are very detailed and the variability is almost unknown. We attribute, with some doubts, our specimens to *P. femoralis* on the basis of these descriptions. The specimens from Baiteta Forest are totally yellow green to olive green except the black or dark red apices of cunei and the dark two last segments of antenna, as described in the literature. Among Papuan *Prolygus*, just one species, *P. femoralis*, has such habitus. *P. stali* is unicolourous yellow, the cuneus included, and *P. concolor* was synonymized with *P. femoralis* by Carvalho (1987c: 143), a nomenclatorial act omitted by Schuh (1995, 2002-2013). However, the tibial spines of our specimens are light yellow to red, not dark brown (*contra* Carvalho and Poppius, op. cit.), the two last antennal segments are almost black (not respectively brown and dark brown) and the male genitalia are not totally identical with Carvalho's drawings (op. cit.: p. 143, figs 15-17). The significance of these differences is difficult to evaluate as the literature is difficult to interpret. For example, tibial spines are described by Poppius (1914b: 376) and Carvalho (1987c: 1942) as dark brown, but a specimen from Mindick compared with the type by Carvalho has yellow spines, the colour of the two first antennal segments are not described by both authors etc.

The taxonomic status of the nominal species *P. concolor* is definitely unsolvable. The female holotype being lost (Carvalho 1987c), Carvalho's subjective synonymy will remain unconfirmable. The selection of the holotype of *P. femoralis* as neotype of *P. concolor* could allow to fix the nomenclatorial status of *P. concolor*.

Hosts: In Baiteta Forest, 29 specimens of *P. femoralis* were recorded in 15 independent collection events, by light traps and by fogging, from *Celtis philippinensis* (Ulmaceae), *Chisocheton ceramicus* (Meliaceae), *Dracontomelum dao* (Anacardiaceae), *Pometia pinnata* (Sapindaceae), *Terminalia sepikana* (Combretaceae) and *Tristiropsis acutangula* (Sapindaceae).

Prolygus polhemusorum **sp. nov.** (Figs 124-130, 145-150, plate 17 figs 4-5)

Holotype ♂ ISNB: Papua New Guinea: Madang: "*Prolygus polhemusorum* sp. nov. FC n°4053. Det. F. Chérot, 2011" / "Holotype *Prolygus polhemusorum* Chérot, Gorczyca, Schwartz & Demol" / "Coll. I.R.Sc.N.B.,

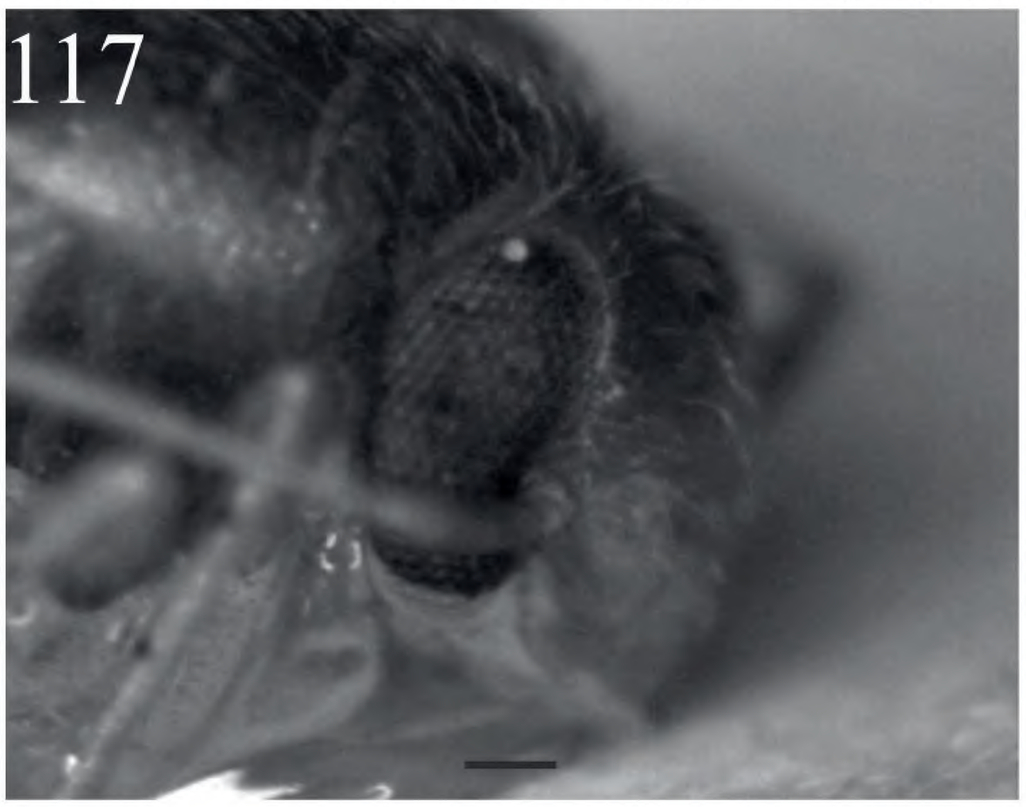


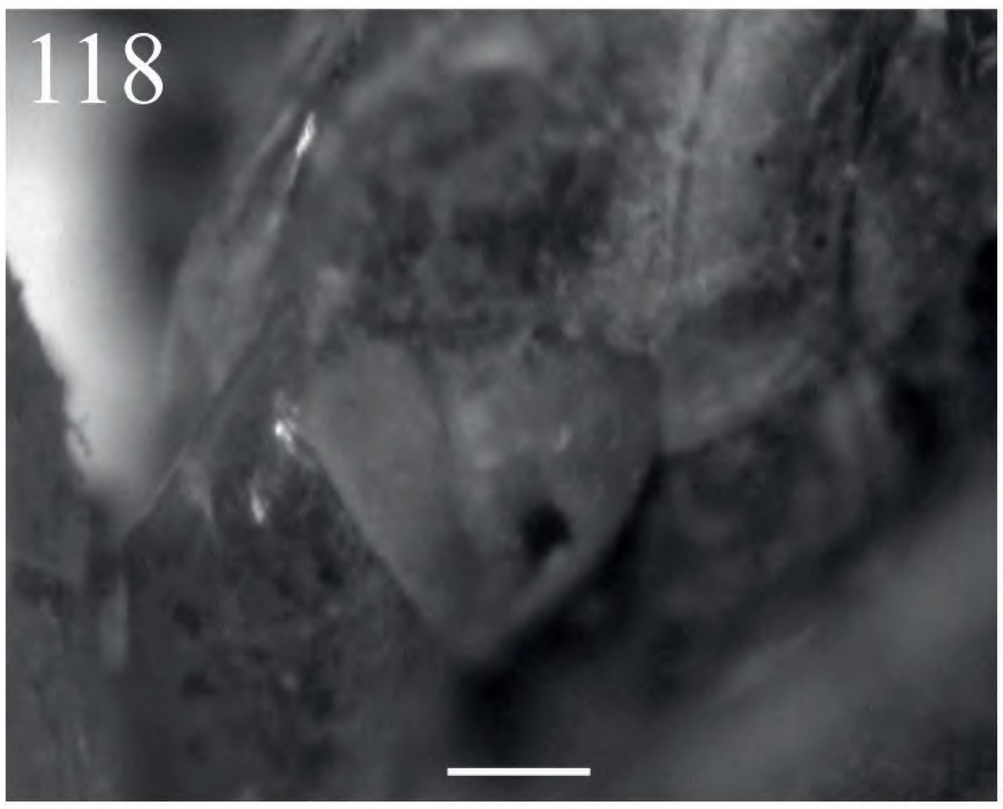


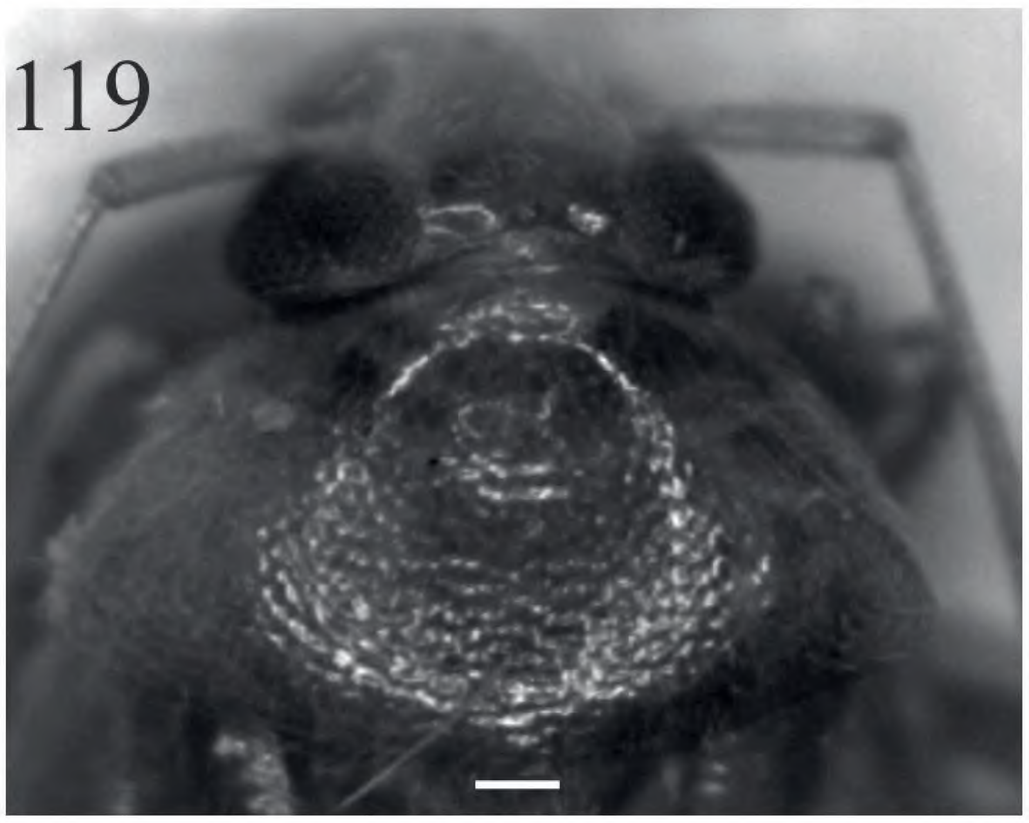
Canopy Mission Papua New Guinea, (Madang prov.): Baiteta 10.v.1995, fogging AR5 [the code AR5 corresponds to *Chisocheton ceramicus* (Melicaceae)], leg. O. Missa" (FC n°s 4053).

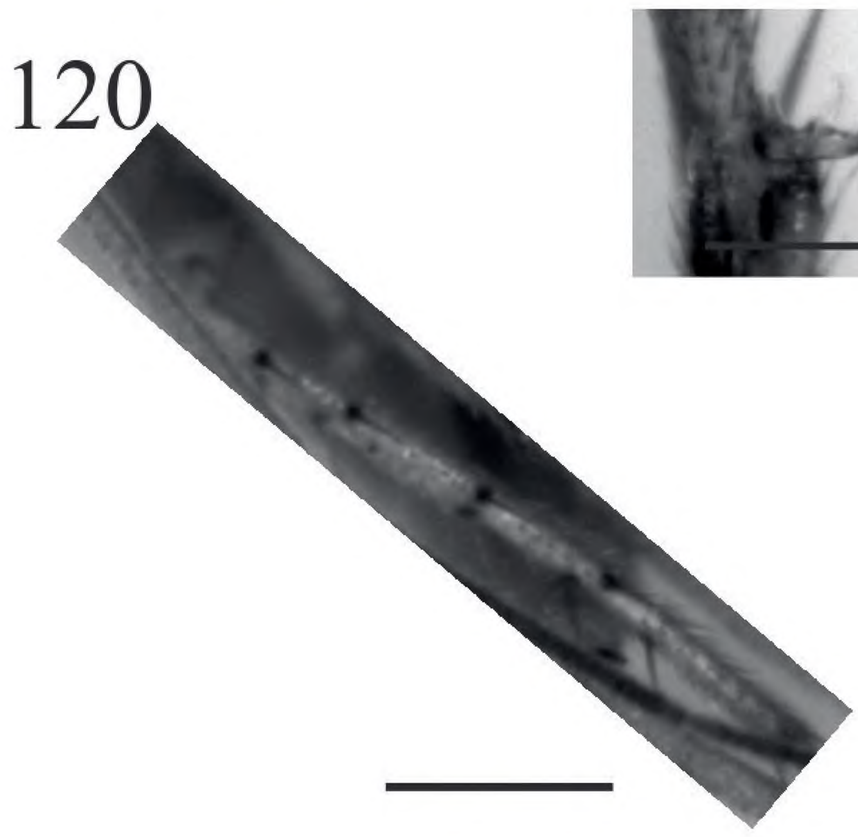
Paratypes 5 specimens ISNB: 2♂ & 1♀: same data than the holotype (FC n°s 4031, 4048, 4054). 1?: Baiteta, 02.viii.1995, O. Missa leg., on *Dysoxylum patigravianum* (Meliaceae), fogging (FC n° 4052); 1♀: Baiteta, 24.iv.1996, O. Missa leg., on *Chisocheton ceramicus* (Melicaceae), light trap (FC n° 5136a).

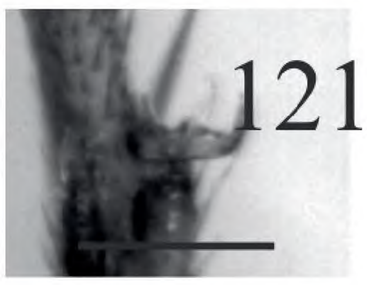
Derivatio nominis: The new species is dedicated to our colleagues the late John Polhemus and his

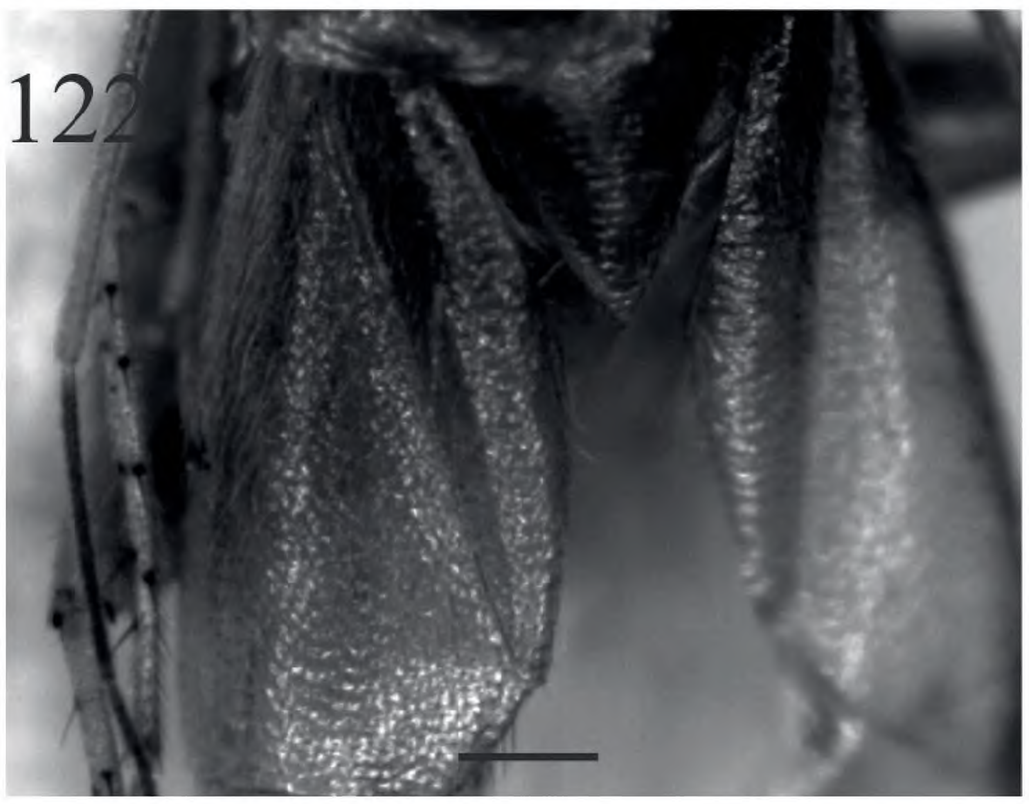


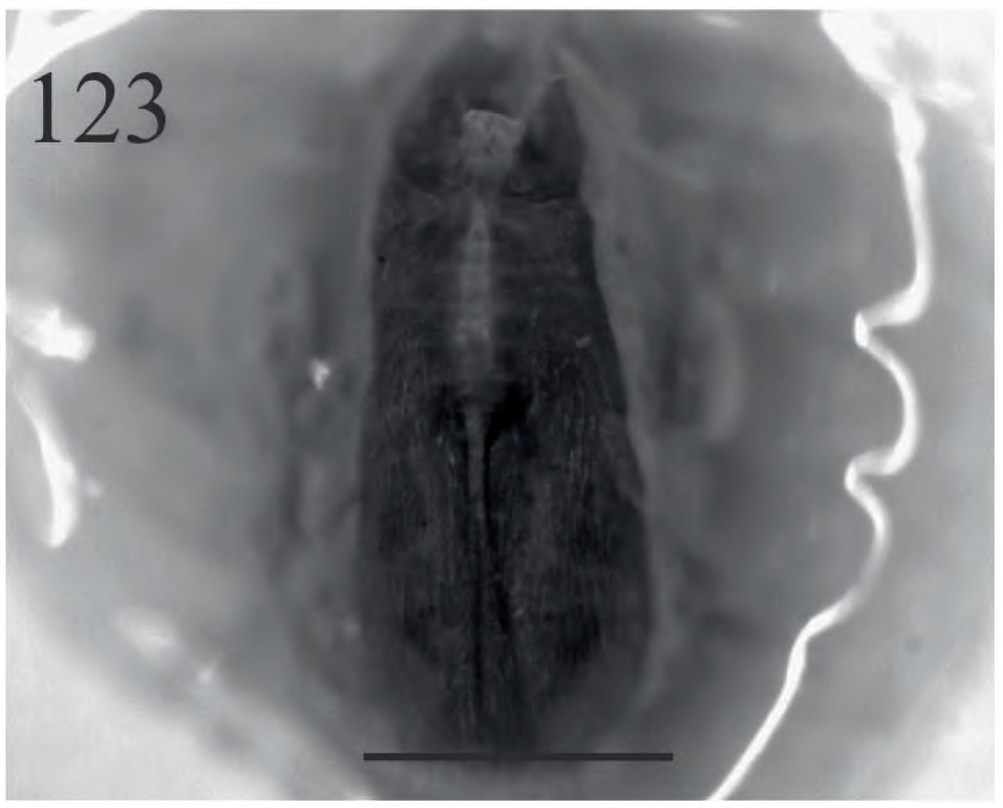












Figures 117-123. *Prolygus* cf. *femoralis* (Poppius, 1914b). 117 – Head, lateral view, ♀ FC n° 4032); 118 – Mesepimeron and metepisternum, ♀ FC n° 4044); 119 – Pronotal surface, ♀ FC n° 4032); 120 – Pretarsus and claw, ♀ FC n° 4032); 121 – Metatibia, ♀ FC n° 4032); 122 – Left clavus, ♀ FC n° 4032); 123 – Abdomen, ventral view, ♀ FC n° 4032) [scale bar 0.1 mm, except figs 121 and 123 scale bar 0.5 mm].






son Dan Polhemus (Bishop Museum, Honolulu, U.S.A.) for their fundamental contributions to the knowledge of the Gerromorpha of the World and Hawaiian Orthotylinae but also for the kind help they always provided to the authors.

Description: Body oblong, dull. Total length in males: 3.98-4.22, total length in female: 3.30. Maximal width of hemelytra (after apex of clavus) in males: 1.84-2.14; maximal width of hemelytra (after apex of clavus) in female: 1.53. Dorsal colouration green-brown (Plate 17 figs 4-5). Head. Clypeus yellow-brown, not covered by frons in dorsal view, almost glabrous. Tylus brown. Maxillary and mandibular plates uncarinate, devoid of tubercle (Fig. 124), yellow-brown. Frons yellow-brown to green-brown, slightly rounded, with very short, recumbent or suberect, white setae, without sericeous or woolly setae (Fig. 125). Eyes glabrous, silvery, occupying about height of head in lateral view. Total width of diatone in males: 0.97-1.07; total width of diatone in female: 1.41. Width of vertex in males: 0.24-0.28; width of vertex in female: 0.28. Vertex carinate, slightly depressed medially. Antenna elongate. First and second segments yellow-brown, second with basal ¼ lighter, yellow, third and fourth segments black. Lengths of joints in males: I: 0.59, II: 1.70-1.90, III: 0.95-1.15 (n = 2), IV: 0.51 (n = 1). Lengths of the joints in female: I: 0.40, II: 1.30, III: 0.65, IV: 0.59. Labium yellow, its apex dark brown, extending slightly beyond metacoxa. Thorax. Pronotum (Fig. 126) green-brown. Total length in males (collar included): 0.87-0.89; total length in female (collar included): 0.71. Posterior width in males: 1.50-1.66; posterior width in females: 1.38. Collar narrow, yellow brownish. Callosities reduced, hardly visible. Punctation of pronotal disk (Fig. 126) relatively wide. Mesoscutum totally covered. Scutellum (Fig. 127) green-brown. Length in males: 0.67-0.75; length in female: 0.59. Basal width in males: 0.67-0.87; basal width in female: 0.63. Legs. Femora and tibia yellowish. Metatibia yellowish, basally with wide red-brown patches. Metatibia with suberect, yellowish setae and yellowish to brownish spines. Tarsi yellow, with base and apex orange-brown. Hemelytra (Fig. 129) green-brown, opaque. Clavus green-brown, with dense, shallow but relatively wide punctation, partially hidden by pilosity. Corium green-brown, punctation less dense. Pilosity recumbent, white, relatively long. Cuneus yellowish. Length of cuneus in males: 0.63-0.75; length of cuneus in female: 0.59. Width of cuneus in males: 0.43 (n = 2); length of cuneus in female: 0.59. Membrane glassy, brownish, veins yellowish. Abdomen yellowish with long, white, setae.

Male genitalia: Left paramere (Fig. 145) sickle-like, sensory lobe (Ls) reduced, tertiary lobe (L3) elongate, with line of elongate setae, narrow arm with two setae tufts, primary apophysis sharp, slightly curved, secondary apophysis pointed (arrow). Right paramere (Fig. 146) stout, apophysis with two lobes. Endophallus (Figs 147-148) complex, including five different sclerites (S1-S5), wide *ductus-seminis* and classical secondary gonopore.

Female genitalia: Anterior sac classical, apparently devoid of sclerite or glandular ring. Dorsal wall complex (Fig. 149). Pair of toothed medial processes (MP) projecting into genitalic chamber, apparently arising from a reinforced part of lateral roof of chamber. Lateral oviducts totally separated, short and stout. Parieto-vaginal rings classical (Fig. 149), partially hidden in dorsal view by dorsal wall, anterior, posterior and latero-outer margins almost straight, latero-inner margins convex. Rings separated by a distance slightly greater than maximal length, linked by medial plate. Dorsal labiate plate slightly sclerotised. Posterior wall (Fig. 150) particularly complex. Dorsal structure in dorsal view apparently divided into two parts: hat (Cha) and plate (plt). Inter-ramal sclerites or A structures (As) with slightly concave dorsal and ventral margins and convex lateral margins. Inter-ramal lobes or E structures (ES) elongate, *Apolygus*-like, arising from reinforcement – or lateral plate – of inter-ramal sclerite dorsal margin, obviously separated from B structure. A membranous area with line of denticles between the interramal and the lateral lobes separates B structure in two parts. Lateral lobes or H structures (HS) wide, elongate and convoluted.

Discussion: *Prolygus polhemusorum* sp. nov. is relatively close to *P. ehannoi* sp. nov. and *P.* cf. *femoralis* by its habitus. It is easily separated from all *Prolygus* species by the male genitalia, particularly by its complex endophallus.

Hosts: In Baiteta Forest, 4 specimens of *Prolygus polhemusorum* sp. nov. were recorded in 3 independent collection events, by fogging and by light trap, on *Chisocheton ceramicus* and *Dysoxylum patigravianum* (both Melicaceae).

"***Lygus***" *incertae sedis* near to ***Prolygus*** (Plate 17 fig. 6)

Additional material ISNB: Papua New Guinea: Madang: 1♀: Baiteta, 12.iv.1996, O. Missa leg., host unknown, fogging (FC n° 4065); 1♀: Baiteta, 25.vii.1996, O. Missa leg., host unknown, fogging (FC n° 4066).



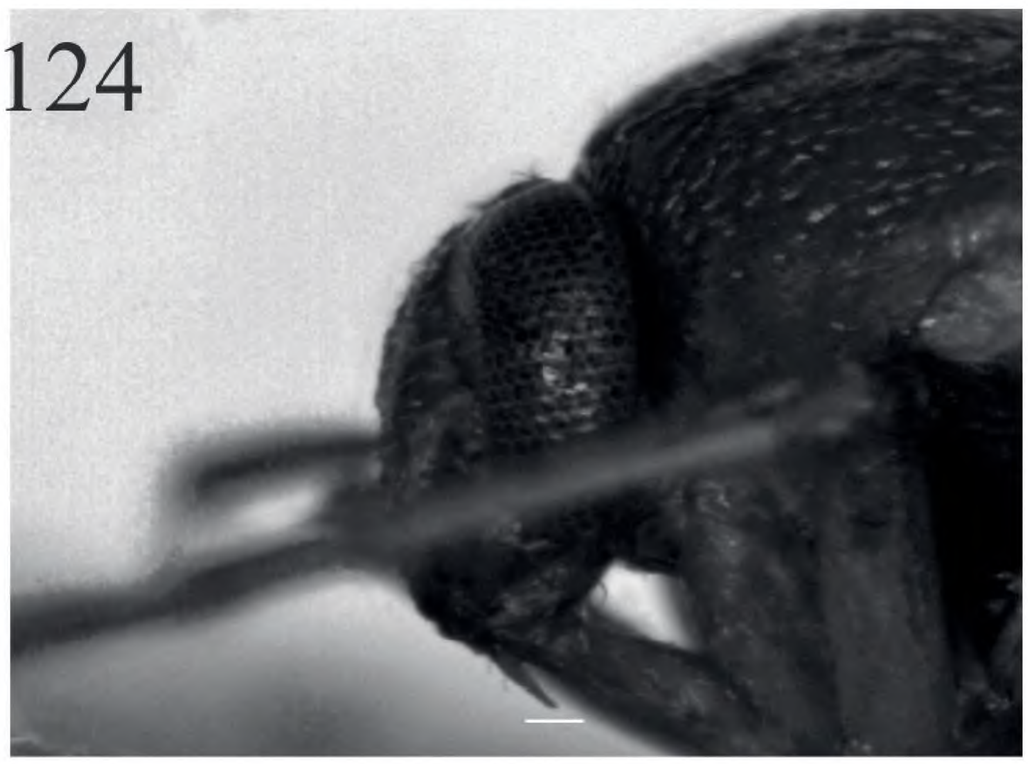


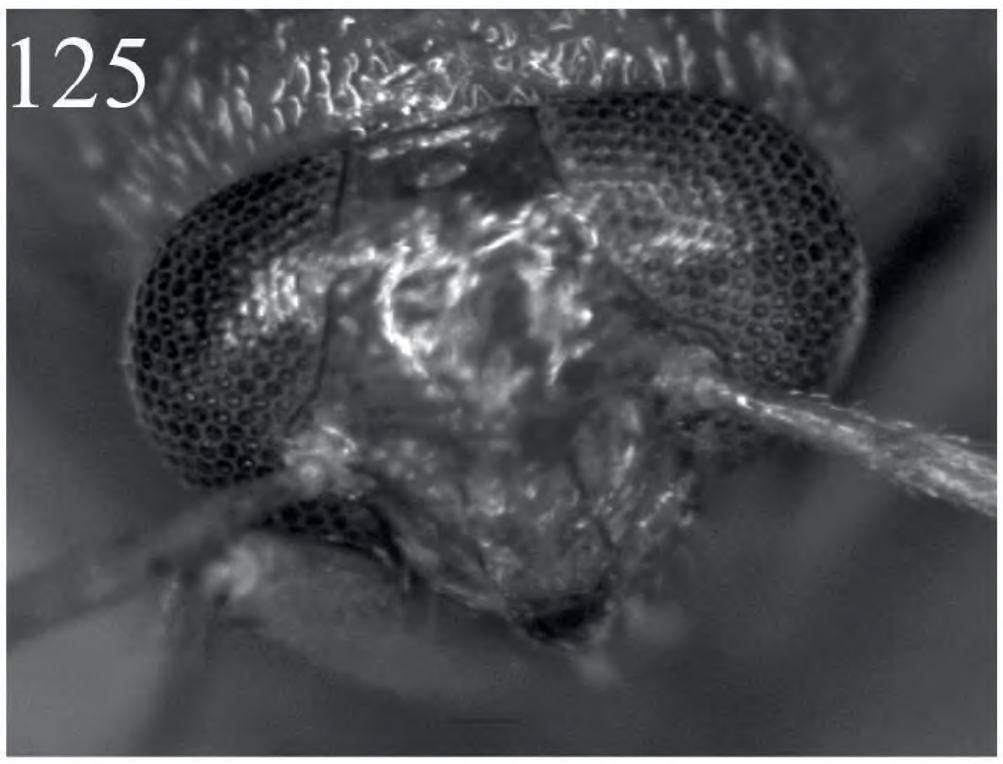
Discussion: We were not able to attribute these two specimens to a genus of the *Lygus*-complex. Additional male specimens would be necessary to correctly classify this taxon.

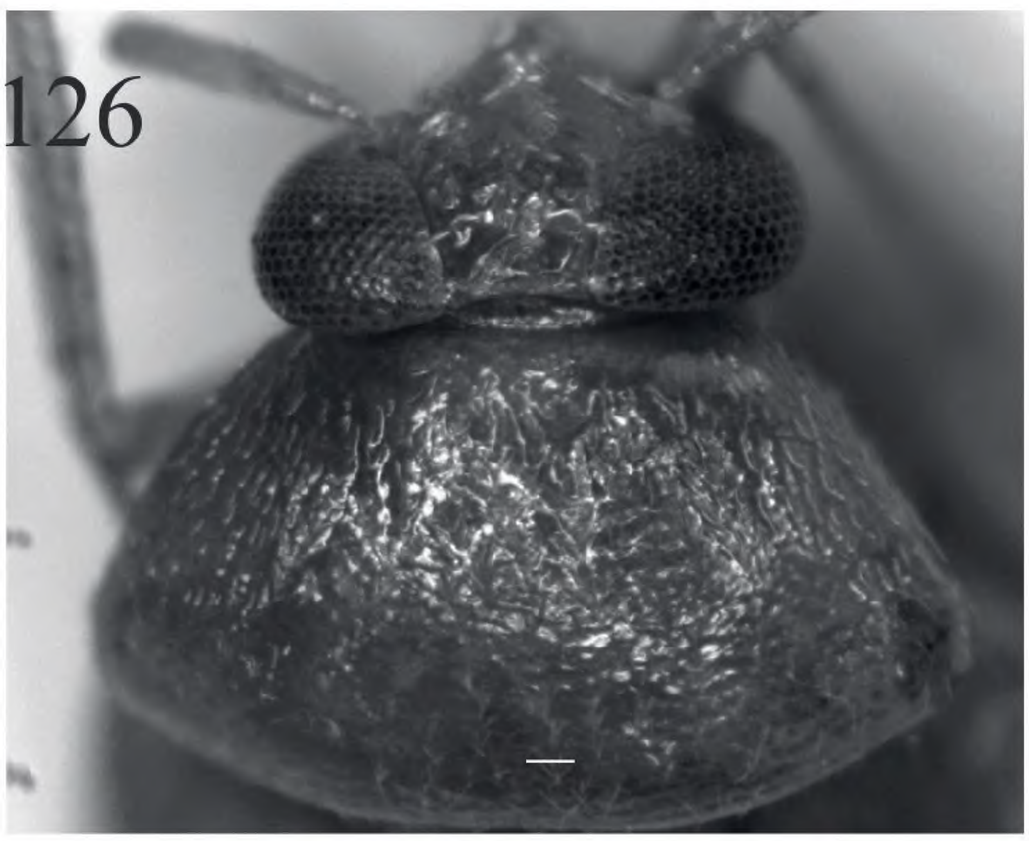
Sabactiopus Zheng, Lin, 2002

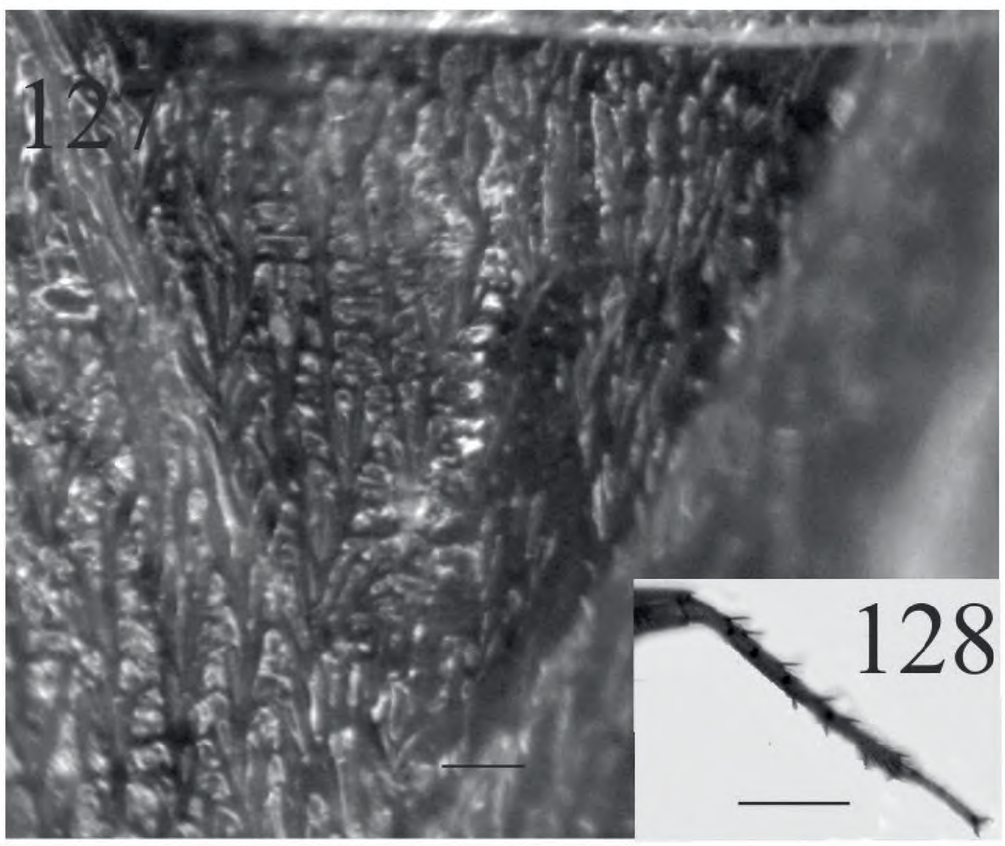
References: *Sabactiopus* Zheng, Lin, 2002: 76-77, as new genus; Schwartz & Chérot 2005: 16-17, new combinations; Zheng et al. 2005: 569-571, 719, redescription, in fauna; Schuh 2002-2013, online catalogue.

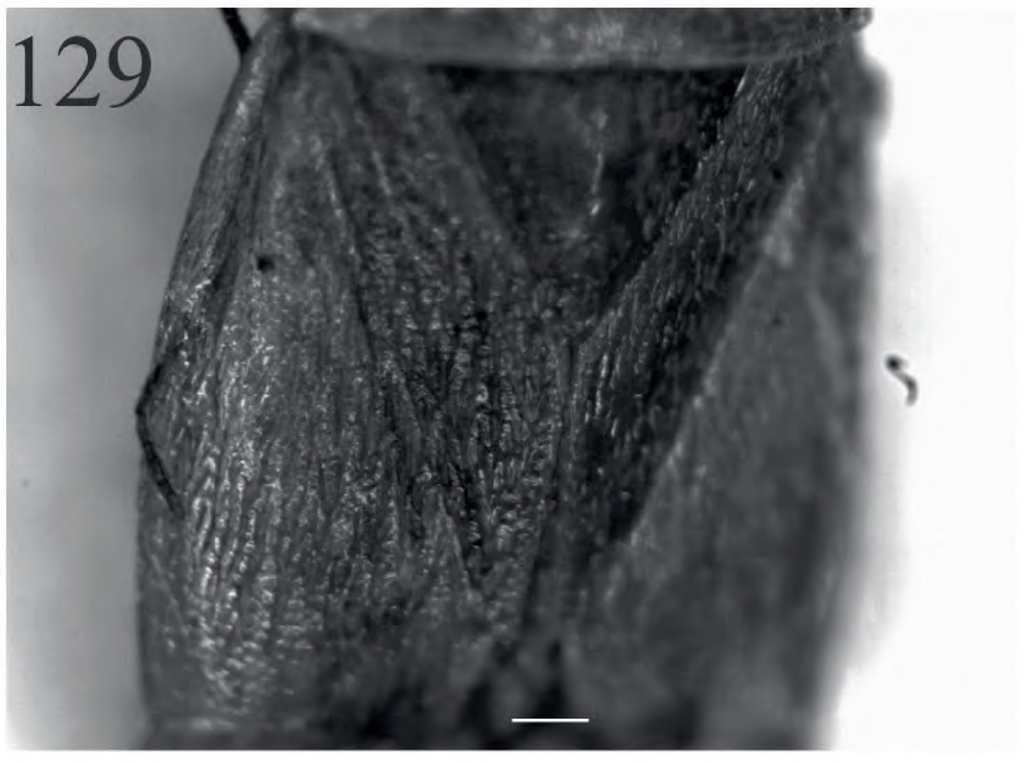
Type species: *Sabactiopus sauteri* (Poppius,

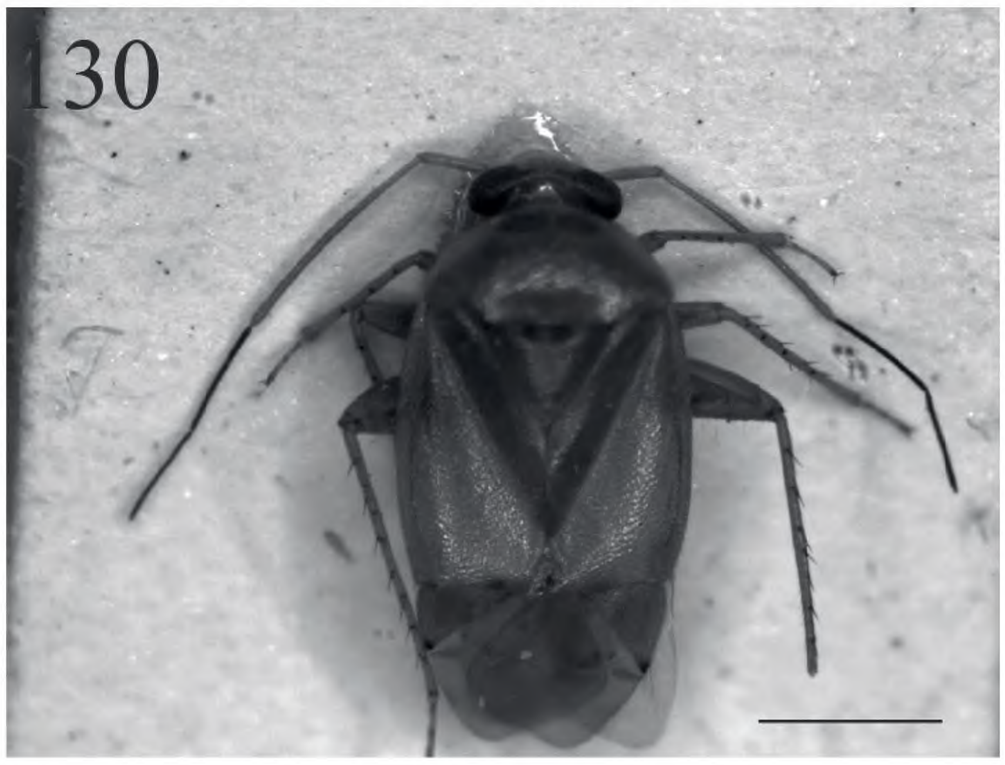












Figures 124-130. *Prolygus polhemusorum* sp. nov. 124-127 – Male holotype: 124 – Head, lateral view; 125 – Head, dorsal view; 126 – Pronotal surface; 127 – Scutellum, dorsal view; 128 – Median leg of female paratype FC n°5136a; 129 – Clavii and anterior parts of coria; 130 – Habitus, dorsal view, paratype ♀ FC n° 5136a [scale bar 0.1 mm, except fig. 128 scale bar 0.5 mm and fig. 130 scale bar 1 mm].






1912d), by original designation.

The genus *Sabactus* Distant, 1910a sensu Schwartz & Kerzhner (1997) and Schwartz & Foottit (1998) was not a homogenous taxon and was subdivided in two genera by Zheng & Lin (2002). The latter authors erected their genus *Sabactiopus* to accommodate *Lygus sauteri* Poppius, 1912d, transferred into the genus *Sabactus* by Schwartz & Kerzhner (1997). Adequate diagnosis of *Sabactiopus* was provided by Zheng & Lin (2002) and is not repeated here.

***Sabactiopus formosus* (Distant, 1904c) comb. nov.**

Additional material 1♂ NHMW: *Sabactiopus formosus* (DISTANT, 1904c): INDIA: north east, MEGHALAYA STATE: Balpakram N(atural) P(ark), W(est) Garo Hills, 22-27.v.1996, 250-550 m., GPS N. 25°, 11', E. 90°51', leg. E. Jenedek & O. Sauss (FC n° 5433).

References: *Liocoris formosus* Distant, 1904c: 464, as new species; Schuh, 1995: 789 (catalog); *Sabactus formosus*: Schwartz & Foottit, 1998: 366, new combination.

Discussion: *Liocoris formosus* was described by Distant (1904c: 464) from Burma, Tenass Valley and subsequently reclassified in the genus *Sabactus* Distant, 1910a by Schwartz & Foottit (1998). By its habitus, *L. formosus* is close related to *L. sauteri* and consequently, we suggest the new combination: *Sabactiopus formosus* (Distant, 1904c) comb. nov.

***Sabactiopus zhengi* sp. nov.** (Figs 131-137, 151-154, plate 17 fig. 7)

Holotype ♂ ISNB: Papua New Guinea: Madang: "*Sabactiopus zhengi* sp. nov. FC n°5067. Det. F. Chérot, 2011" / "Holotype *Sabactiopus zhengi* Chérot, Gorczyca, Schwartz & Demol" / "Coll. I.R.Sc.N.B., Canopy Mission Papua New Guinea, (Madang prov.): Baiteta 24.v.1995, fogging AR7 [the code AR7 corresponds to *Buchaniana heterophylla* (Anacardiaceae) or *Vitex cofassus* (Verbenaceae) or *Hernandia ovigera* (Hernandiaceae)], leg. O. Missa" (FC n°s 5067).

Other taxa examined for comparison: *Sabactiopus laevipennis* Poppius, 1914b. Philippines Islands: Luçon Island: lectotype ♀ ZMHF, designation: Schwartz & Chérot, 2005: "Mus. Zool. H:fors, Spec. typ. 10287, *Lygus laevipennis* Popp." / "1277" / "Los Banos, P. I. Baker". Sabactiopus sublaevis Poppius, 1914b. Indonesia: Sulawesi: Holotype ♀ HNHM: "Sabactus sublaevis Det. M. D. Schwartz, 1997" / "Typus" / "Sabactus sublaevis sp. nov."/ "S(outh) Celebes, Bua Kraeng, 5000`, II.1896, H. Fruhstorfer".

Derivatio nominis: The new species is dedicated to Prof. Leyi Zheng from Nankai University, Tianjin, Poeples Republic of China, for his important contribution to the knowledge of Chinese Heteroptera, particularly of the Miridae subfamily Mirinae.

Description: Body rounded, stout, strongly shining. Total length: 4.10; maximal width of hemelytra (after apex of clavus): 2.08. Dorsal colouration black and yellow to orange brown, contrasting (Plate 17 fig. 7). Head. Clypeus yellow, not covered by frons in dorsal view, with short, suberect, white setae. Tylus orange. Maxillary and mandibular plates uncarinate, lacking tubercle (Fig. 131), mandibular plates yellow to orange-brown, slightly striate, maxillary plates darker, red. Frons yellow, slightly rounded, almost glabrous, with some very short, recumbent or suberect, white setae, without sericeous or woolly setae (Fig. 133). Eyes almost glabrous, silvery, occupying about 75 percent of height of head in lateral view, covering partially pronotal collar in dorsal view. Total width of diatone: 1.10, width of vertex: 0.36. Vertex obviously carinate, slightly depressed medially. Carina narrow, curved laterally. Antenna elongate. First and second segments yellow to orange-brown, first with narrow brown ring subapically, second with apical 1/4 red-brown, third and fourth segments missing. Lengths of joints: I: 0.55, II: 1.70. Labium yellow-brown to red-brown, extending slightly beyond metacoxa. Thorax. Pronotum shining, bicolour (Fig. 133), lateral margins yellow to orange, the middle part black. Total length (collar included): 1.22. Posterior width: 1.96. Collar narrow, orange brown. Callosities reduced, hardly visible. Punctation of pronotal disk (Figs 133, 136) shallow but relatively wide. External scent gland (Fig. 132). Mesoscutum totally covered. Scutellum (Fig. 136) yellowish, base and medial line dark brown to black with red brown margin, apex and lateral corners red brown. Length: 0.75. Basal width: 0.83. Surface slightly striate basally, with some relatively wide punctures laterally. Legs (Fig. 135). Femora and tibia yellow-brown. Spines of protibia orange. Tarsi yellow, with apex of third orange-brown. Claws (Fig. 134). Hemelytra (Fig. 136, plate 17 fig. 7) dark brown to black, opaque. Clavus dark-brown to black, with dense, relatively wide and narrow punctuation. Corium dark-brown, punctation less dense. Cuneus dark brown to black, apex yellowish, intermediate area reddish. Length of cuneus: 0.75. Width of cuneus: 0.40. Membrane glassy, brownish with yellowish areas, veins brown. Abdomen (Fig. 137): brown with long white setae.

Male genitalia: Left paramere (Fig. 151) sickle-





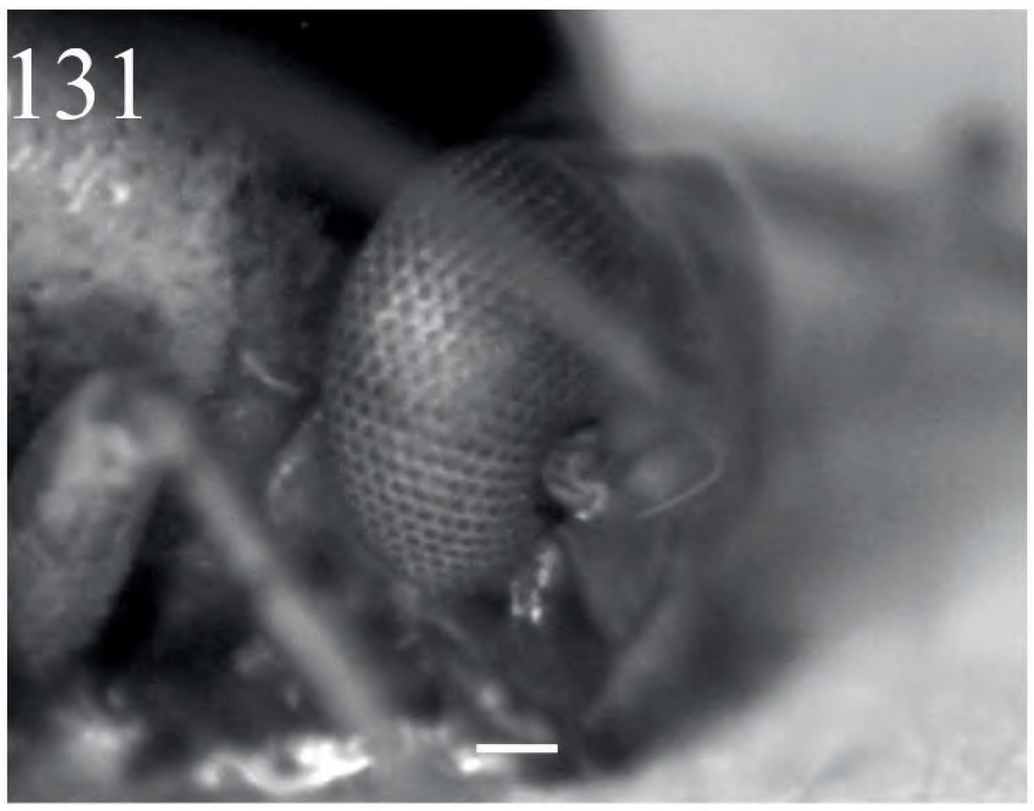


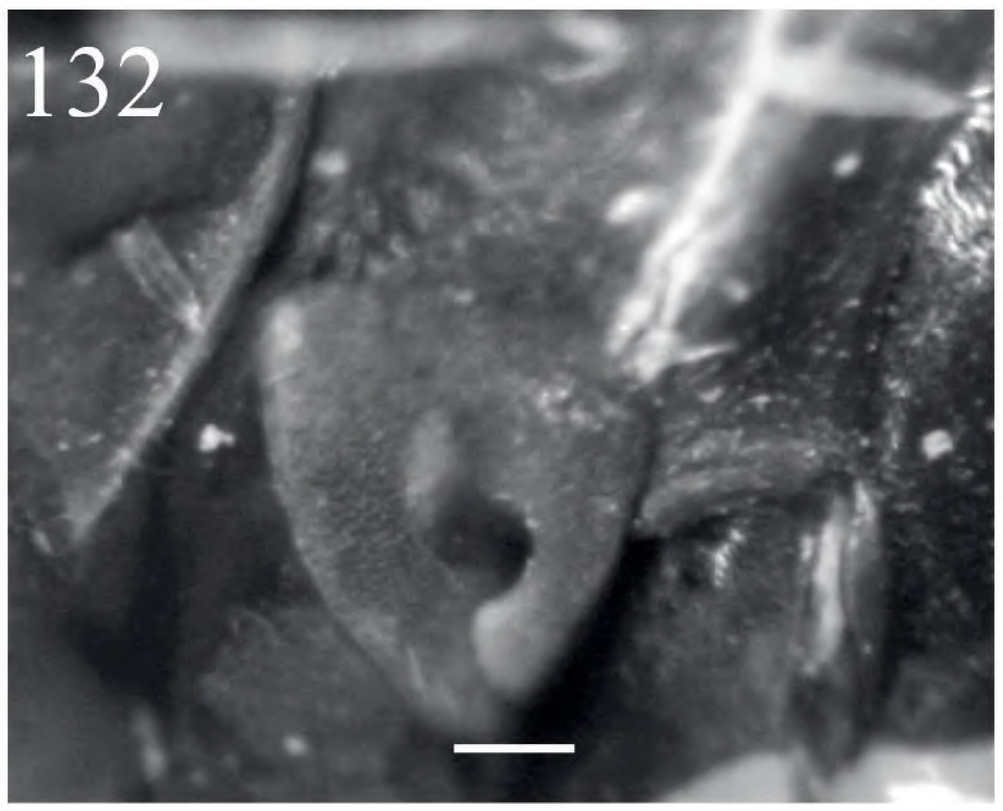


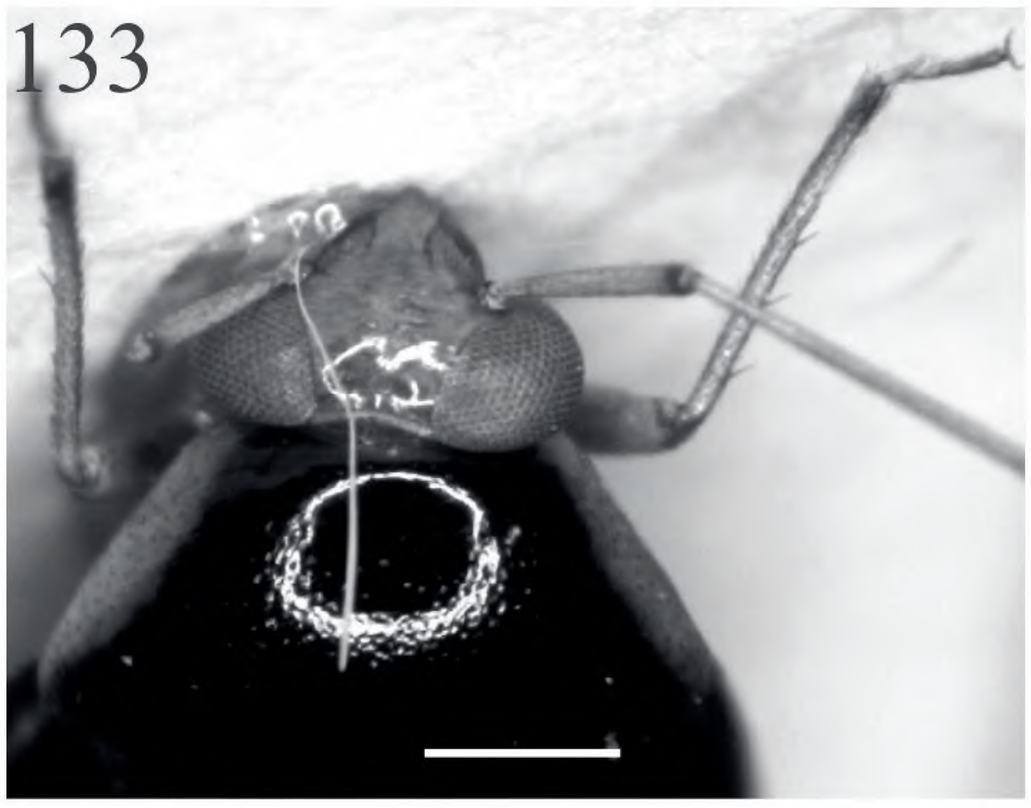
like, the sensory lobe (Ls) relatively reduced, toothed, body wide, primary apohysis (Ap1) with hooked apex (Fig. 152). Right paramere (Fig. 153) with pointed tertiary lobe (L3) and primary apohysis (Ap1). Endophallus (Fig. 154) with elongate ACH, small spiculum (Sp) and elongate toothed lateral lobe.

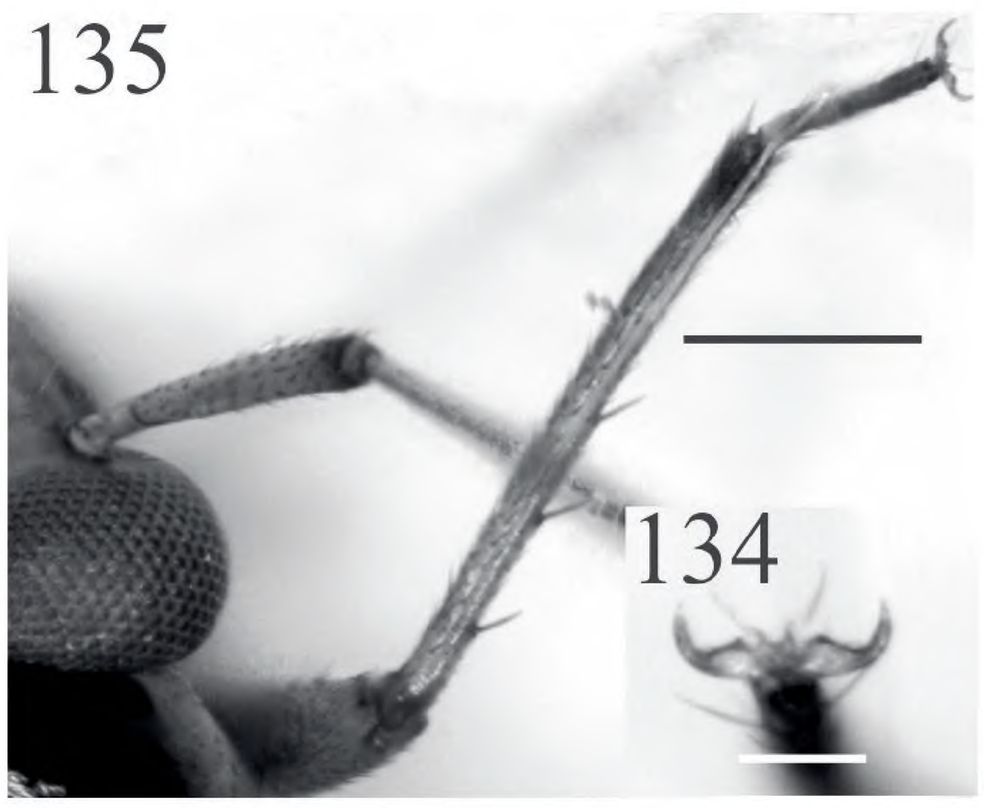
Sexual dimorphism: Female unknown.

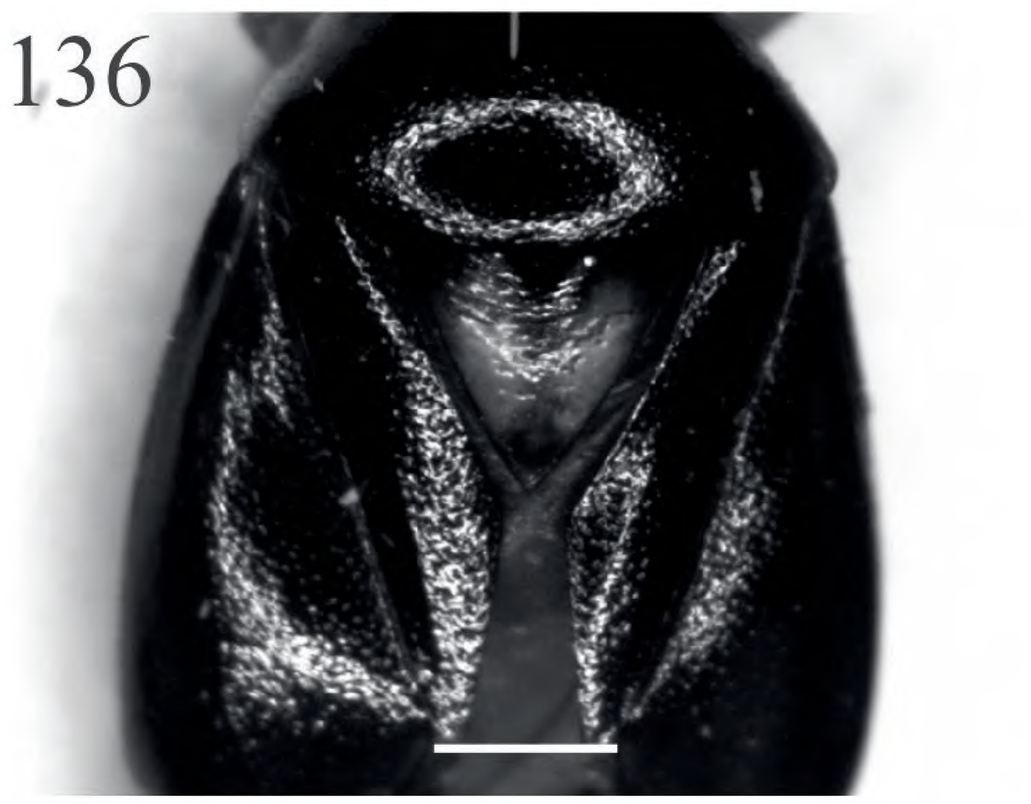
Discussion: The relatively small, rounded, strongly shining body, the head vertical, short and high in lateral view, the vertex weakly depressed medially, fully carinate, the carina thick, slightly curved, the pronotum declive, almost glabrous, the anterior lateral corners of the pronotum and the collar

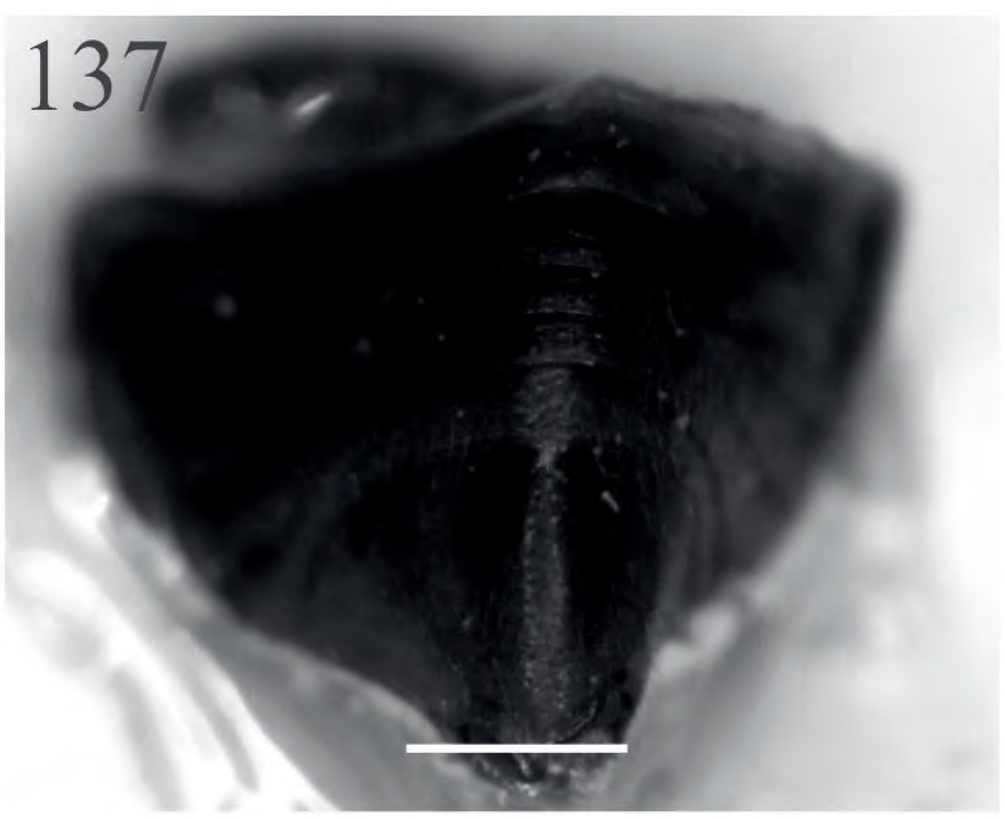




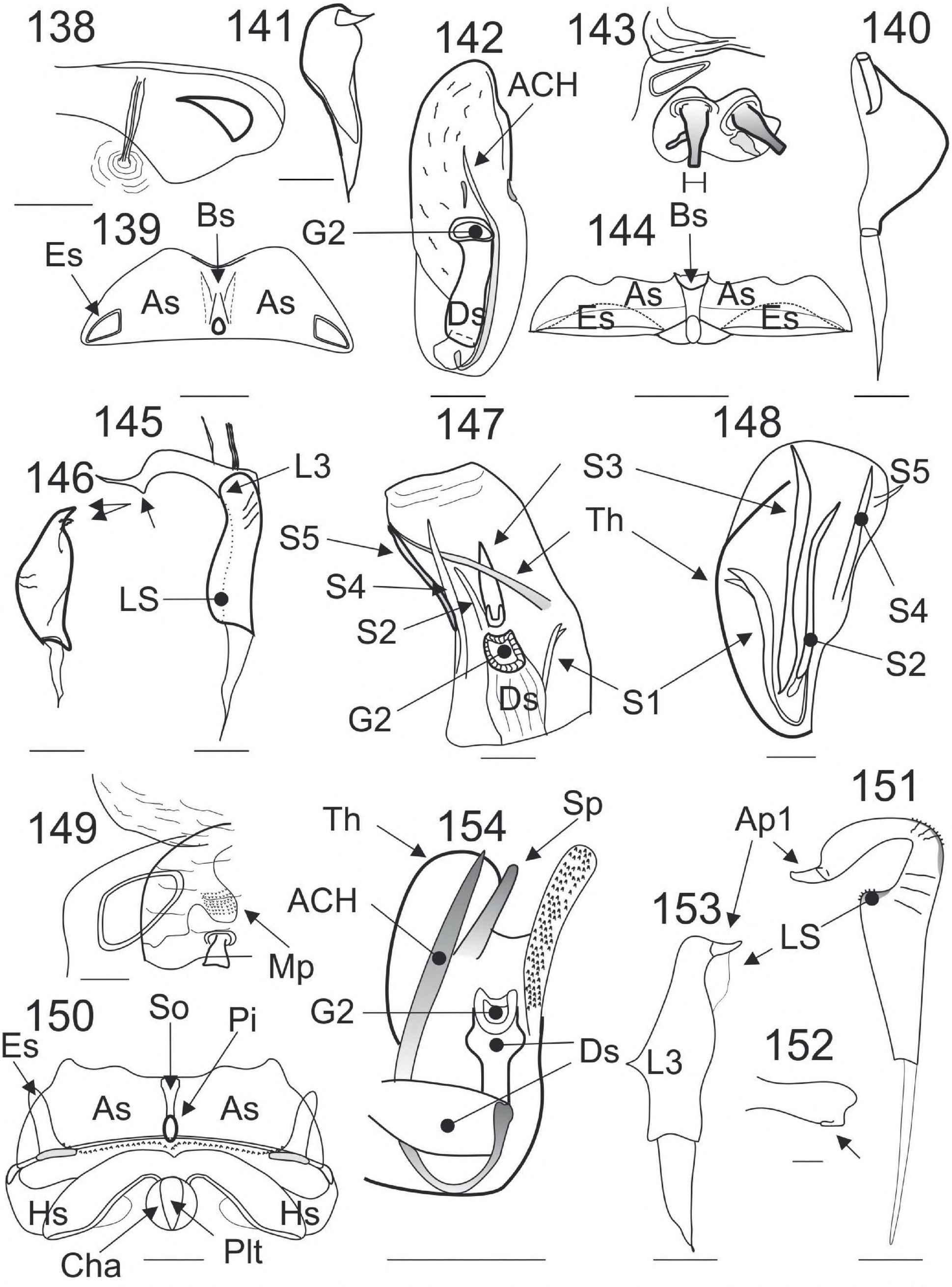








Figures 131-137. *Sabactiopus zhengi* sp. nov., holotype ♂ FC n° 5067; 131 – Head, lateral view; 132 – Mesepimeron and metepisternum; 133 – Head and pronotal surface, dorsal view; 134 – Pretarsus and claw; 135 – Anterior leg; 136 – Hemelytra; 137 – Pygophore [scale bar 0.1 mm, except figs 133 and 135-136 scale bar 0.5 mm].



Figures 138-152. Genital structures of Papuan Heteroptera. 138-139 – *Prolygus erimensis* (Poppius, 1914b), parieto-vaginal rings, dorsal view and posterior wall, FC n° 4068; 140-144 – *Prolygus* cf. *femoralis* (Poppius, 1914b), genitalia of both sexes: 140 – Left parameres, dorso-lateral view; 141 – Right paramere, dorsal view; 142 – Endophallus; 143 – Left parieto-vaginal ring and dorsal wall, dorsal view; 144 – Posterior wall; 145-150 – *P. polhemusorum* sp. nov., genitalia of both sexes, paratypes FC n°S 4054 and 5136a; 145 – Left paramere, dorsal view; 146 – Right paramere, dorsal view; 147-148 – Endophallus in different views; 149 – Left parieto-vaginal ring and dorsal wall, dorsal view; 150 – Posterior wall; 151-154 – *Sabactiopus zhengi* sp. nov., genitalia of male holotype; 151 – Left paramere, dorsal view; 152 – Apex of left paramere; 153 – Right paramere, dorsal view; 154 – Endophallus in dorso-lateral view [scale bar 0.1 mm].



partially hidden by the eyes in dorsal view, the collar lower than the anterior part of the pronotal disk, the pronotal punctures shallow and narrow, the pronotal callosities flat, the hemelytra shining, the clavus coarsely and shallowly punctate, the corium narrowly punctate, the colouration black and yellow to orange-brown of S. *zhengi* all perfectly conform with Zheng & Lin's (2002: 76-77) original diagnosis and description of the genus *Sabactiopus*.

At present, the genus *Sabactiopus* includes three species: S. *sauteri* Poppius, 1912d, its type species, S. *laevipennis* Poppius, 1914b and S. *sublaevis* Poppius, 1914b (cf. Schwartz & Chérot, 2005).

From these three species, *Sabactiopus zhengi* sp. nov. can be easily separated by the hemelytra almost unicolourous black devoid of yellow or yellow brownish areas. The scutellum not totally black and the pronotal disk black with the margins yellowish of S. *zhengi* sp. nov. differ obviously from *Apolygus eous* (Poppius, 1915b) and *Prolygus niger* (Poppius, 1915b) [14] patterns, two dark members of the *Lygus*-complex from the Oriental Region.

Hosts: Unknown. In the Baiteta Forest, *Sabactiopus zhengi* sp. nov. was recorded only once, by fogging, on an unknown host plant.

Tinginotopsis **Poppius, 1915b**

References: *Tinginotopsis* Poppius, 1915b: 23-24, as new genus; Schuh 1995: 963, catalogue; Kerzhner & Josifov 1999: 180-181, catalogue; Eyles 2000: 116, redescription; Zheng et al. 2005: 583, 686, 698, redescription, in fauna; Schuh 2002-2013, online catalogue.

Type species: *Tinginotopsis dromedarius* Poppius, 1915b, a junior synonym of *Tinginotopsis oryzae* (Matsumura, 1910), the synonymy by Yasunaga et al. 1996.

Redescription: Adequate diagnoses of *Tinginotopsis* were provided by Carvalho (1987a), Yasunaga (1999), and Eyles (2000) and are not repeated here.

Tinginotopsis camelus **Poppius, 1915a** (Plate 18 fig. 1)

Lectotype ♂ ZMHF, designation by Carvalho, 1987a: 166-167: Papua New Guinea: Morobe: "Mus. Zool. Hels. Loan n° HE 96-42" / "*Tinginotopsis camelus* Popp. Det. J.C.M. Carvalho" / "Mus. Zool. ZMHF. Loan n° HE 2964" / "Mus. Zool. H:fors. Spec. typ. n° 10166 *Tinginotopsis camelus* Popp." (partially manuscript label) / "*Tinginotopsis camelus* sp. nov." (manuscript label) / "lectotype" / "Sattelberg, Huon Golf" / "N. Guinea. *Biró* 1899" (FC n°946a).

Additional material: Papua New Guinea: Madang: 1♂ & 1♀ ISNB: Baiteta, 07.vi.1996, O. Missa leg., host plant unknown, fogging (FC n° 3899-3900); Northern Province: 1? BMNH: Kokoda. 200 feet. IX.1933, L. E. Cheesman, B. M. 1934-321 (FC n° 1356).

References: *Tinginotopsis camelus* Poppius, 1915a: 59, as new species; Schuh 1995: 963, catalogue; Eyles 2000: 115, 116-117, redescription, FG, eggs; Schuh 2002-2013, online catalogue.

Discussion: *Tinginotopsis camelus* Poppius, 1915 was described on a series of specimens of both sexes from Sattelberg, Huon Gulf, Morobe Province and from Astrolabe Bay, Madang Province, Papua New Guinea. Carvalho (1987a: 167) cites numerous specimens from Indonesia, Papua Barat (Baliem Valley; Kebar Valley; Star Mountains; Warris) and from Papua New Guinea (Kassam, 48 km E. of Kainantu, Eastern Highlands; Kokoda, Northern Province; Lae beach, Morobe Province; Wau, Morobe Province).

Hosts: In Baiteta Forest, *T. camelus* was recorded one time, by fogging, on an unknown host plant.

Tinginotum **Kirkaldy, 1902a**

References: *Tinginotum* Kirkaldy, 1902a: 263, as new genus; Carvalho, 1959: 267, catalogue; Odhiambo, 1960: 466-467, redescription; Carvalho, 1987a: 169-170, redescription; Schuh, 1995: 963-965, catalogue; Yasunaga, 1999: 39, redescription; Eyles, 2000: 112, diagnosis; Zheng et al. 2005: 584-585, 687, 720, redescription, in fauna; Schuh, 2002-2013, online catalogue.

Type species: *Tinginotum javanum* Kirkaldy, 1902a, by monotypy.

Redescription: Adequate diagnoses of *Tinginotum* were provided by Odhiambo (1960), Carvalho (1987a), Yasunaga (1999) and Eyles (2000) and are not repeated here.

Tinginotum knowlesi **(Kirkaldy, 1908a)** (Plate 18 fig. 2)

Additional material: Papua New Guinea: Madang: 1♂ ISNB: Baiteta, 26.iii.1993, O. Missa leg., on *Pometia pinata* (Sapindaceae), light (FC n° 3902); 1♂ & 3♀ ISNB: *idem*, 19.v.1993, O. Missa leg., on *Pometia pinata*

14 This species is cited, as "sp. nov.", in the key and the list of Poppius' Indo-Australische *Lygus*-Arten (1914b, respectively p. 340 and p. 396) but is not described in detail in this paper. It is described in detail in Poppius' H Sauter's Formosa Ausbeute (1915b: 35-36) and then generally credited to Poppius (1915b) and not to Poppius (1914b). It is also the case for the other new species from Taiwan include in both works, for example *Lygus eous*, as pointed out by Poppius himself (1914b: 337) in his introduction of the *Lygus*-Arten paper.






(Sapindaceae), light (FC n° 3905, 3907-3909); 1♂ ISNB: *idem*, 09.vi.1993, O. Missa leg., on *Pometia pinata* (Sapindaceae), light (FC n° 3901); 1♂ ISNB: *idem*, 14.vi.1995, O. Missa leg., on *Chisocheton ceramicus* (Meliaceae), fogging (FC n° 3911); 3♂ & 1♀ ISNB: *idem*, 03.viii.1995, O. Missa leg., on *Artrocarpus incisus* (Moraceae), fogging (FC n° 3827-3830); 1♂ ISNB: *idem*, 24.iv.1996, O. Missa leg., on *Chisocheton ceramicus* (Meliaceae), light trap (FC n° 3906); 1♂ ISNB: *idem*, 24.iv.1996, O. Missa leg., host unknown, light trap (FC n° 3904); 1♀ ISNB: *idem*, ?.iv.1996, O. Missa leg., host unknown, fogging (FC n° 3910); 1♂ ISNB: *idem*, 01.vii.1996, O. Missa leg., *Buchanania heterophylla* (Anacardiaceae) or *Vitex cofassus* (Verbenaceae) or *Hernandia ovigera* (Hernandiaceae), light (FC n° 3903).

References: *Neosodaphne knowlesi* Kirkaldy, 1908a: 381, as new species; Carvalho & Wallerstein 1976: 688-689, redescription, MG; *Tinginotum knowlesi*: Carvalho 1987a: 174-175, redescription, synonymy, MG; Schuh 1995: 964, catalogue; Eyles 2000: 115-116, citation; Schuh 2002-2013, online catalogue.

Discussion: *Tinginotum knowlesi* (Kirkaldy, 1908) was described at least on the male holotype from Lautoka, Viti Levu Island, Fiji Islands. This type specimen was subsequently redescribed by Carvalho & Wallerstein (1976). Kirkaldy's text seems indicate that the author has seen more than one specimen (it mentions variability in number of tufts of setae on scutellum and two different host plants). However, Kirkaldy does not explicitly include additional specimens in his type-series. Carvalho (1987a: 174) cites numerous specimens from Indonesia, Papua Barat (Wewak, Biak Island; Genjan, 40 km W. of Hollandia, presently Jayapura; Ifar, Cyclops Mountains; Kebar Valley; Wisselmeren, presently Paniai Lakes) and from Papua New Guinea (Astrolabe Bay, Madang Province; Betege, 20 km E. of Koroba, Southern Highlands; Deradere, near Javarere, Central Province; Finschafen, Morobe Province; Fly River, Kiunga, Western Province; Koitaki; Kokoda, Northern Province; Mt Kaindi, Morobe Province; Numbu, Upper Chimbu Valley, Chimbu or Simbu; Sattelberg, Huon Gulf, Morobe Province; Malmalwau, Vunakanau, East New Britain; Schleitniz Mountains, New Ireland Island, New Ireland Province; Woodlark Island, Milne Bay Province), including types of junior synonyms. The species occurs also widely in Pacific Islands such Guam (United States of America), Caroline Islands (Federal State of Micronesia), Cook Island, Niue Island, Samoa, Society Island (French Polynesia) and Tahiti (French Polynesia) (Carvalho 1956; Eyles 2000; Schuh 1995).

Hosts: In Baiteta Forest, 15 specimens of *Tinginotum knowlesi* (Kirkaldy, 1908) were recorded in 9 independent collection events, by fogging and by light trap, from *Artrocarpus incisus*, *Chisocheton ceramicus*, *Pometia pinnata* and several unknown host plants. In the literature, *T. knowlesi* was also cited as recorded from *Artrocarpus altilis* (Eyles 2000: 115), from *A. incisus* (both Moraceae) (Kirkaldy 1908a: 381; Carvalho & Wallerstein 1976: 688) and from tobacco leaves (Solenaceae) (Kirkaldy 1908a: 381; Carvalho & Wallerstein 1976: 688).

Warrisia Carvalho, 1986a

References: *Warrisia* Carvalho, 1986a: 493-94, as new genus; Schuh, 1995: 975, catalogue; Yasunaga et al. 2002: 18-19; Schuh, 2002-2013, online catalogue.

Type species: *Lygus huonensis* Poppius, 1914b, original designation.

= *Gotocapsus* Yasunaga, Nakatani, 1998: 29-30, as new genus.

Type species: *Gotocapsus deraeocoroides* Yasunaga, Nakatani, 1998 (the generic synonymy by Yasunaga et al. 2002: 18).

***Warrisia huonensis* (Poppius, 1914b)** (Figs 162-163, plate 18 fig. 3)

= *Lygus tonkinensis* Poppius, 1914b: 355, as new species; Schuh 1995: 827, as *incertae sedis*; Yasunaga et al. 2002: 19-20, synonymy.

Holotype ♂ MZHF: Vietnam: "Tonkin, Montes Mauson (= Mẫu So'n Mont), Avril Mai, 2-3000', Fruhstorfer" / "*Lygus tonkinensis*" sp. nov. (manuscript) / "Mus. Zool. H:fors. Spec. typ. n° 10258 *Lygus tonkinensis* Popp." / "Holotype *Lygus tonkinensis*, labelled M. D. Schwartz, 1996".

Additional material: Indonesia: Papua Barat: 1♀ MNRJ: Warris, S. of Hollandia, 450-500 m., 1-7.viii.1959, T. C. Maa, Sweeping (FC n° 1461). Papua New Guinea: Madang: 1♀ ISNB: Baiteta, 16.iii.1993, O. Missa leg., on *Dracontomelum dao* (Anacardiaceae), light trap (FC n° 3866); Morobe: 1♂ USNM: Mt Kaindi, 2200-2350 m., 25-26.iii.1965, J. Sedlacek, Malaise Trap (compared with the type of *W. huonensis* by Carvalho, 1987b) (FC n° 1083); 1♀ MNRJ: Kepilam, 2400 m., 20-22.vi.1963, J. Sedlacek, Light trap (FC n° 1460); New Ireland: 1♀ MNRJ: Kandan, 1.i.1960, W. W. Brandt Collector (compared with the type of *W. huonensis* by Carvalho) (FC n° 1459).

References: *Lygus huonensis* Poppius, 1914b: 356, as new species; *Warrisia huonensis*: Carvalho 1986a: 493-495, new combination, redescription; Schuh 1995: 971, catalogue; Yasunaga et al. 2002:

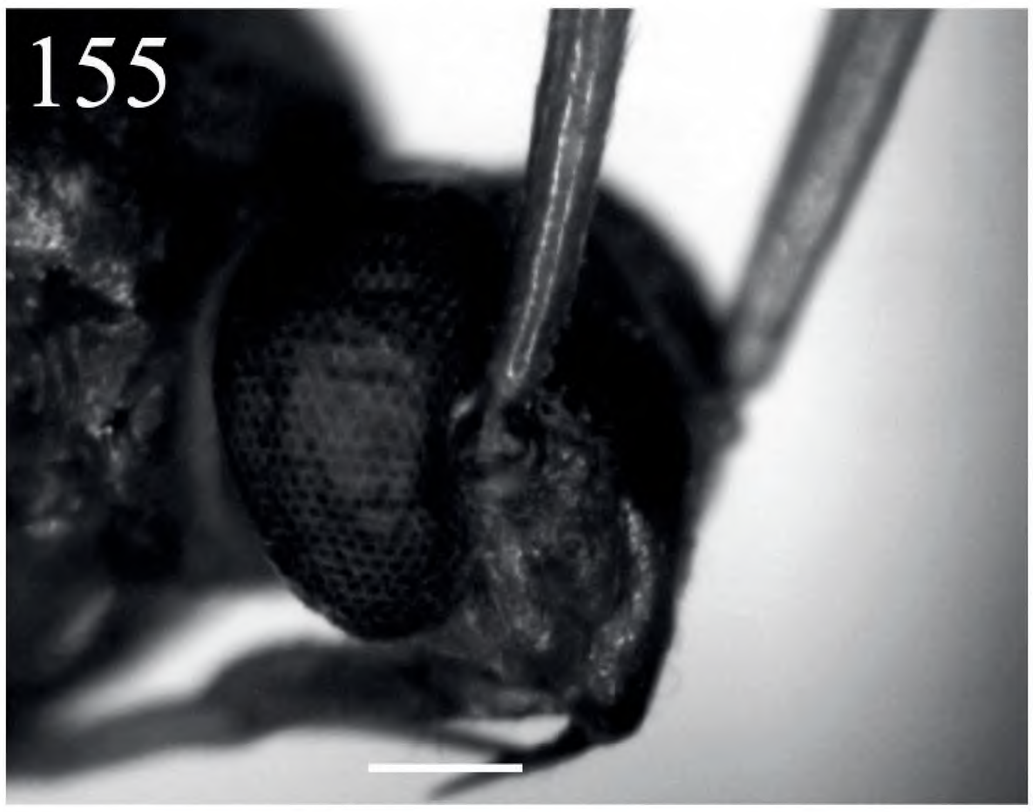


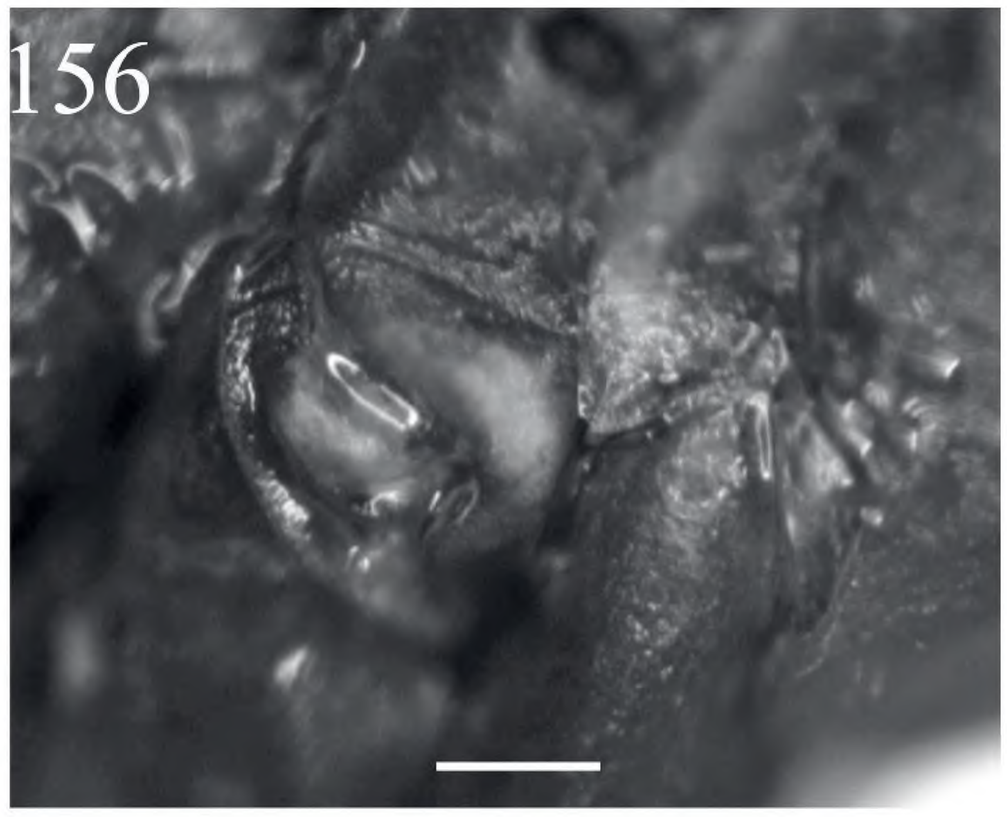


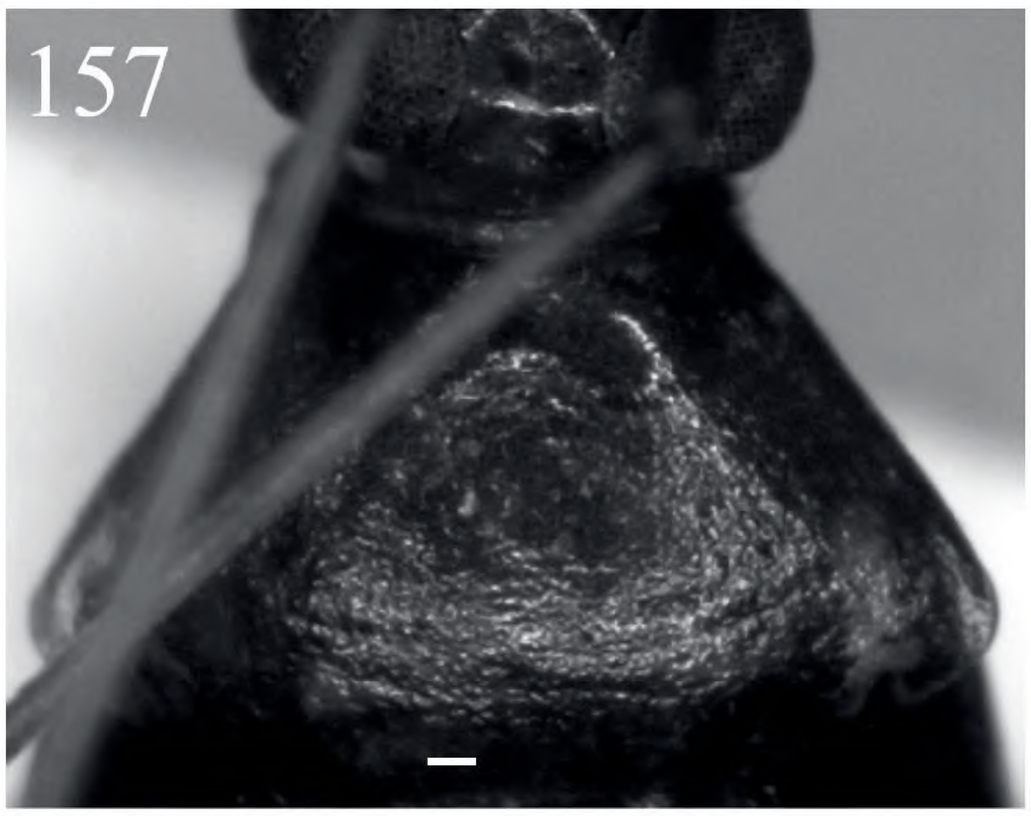

19-21, 22, MG, measurements; Schuh 2002-2013, online catalogue.

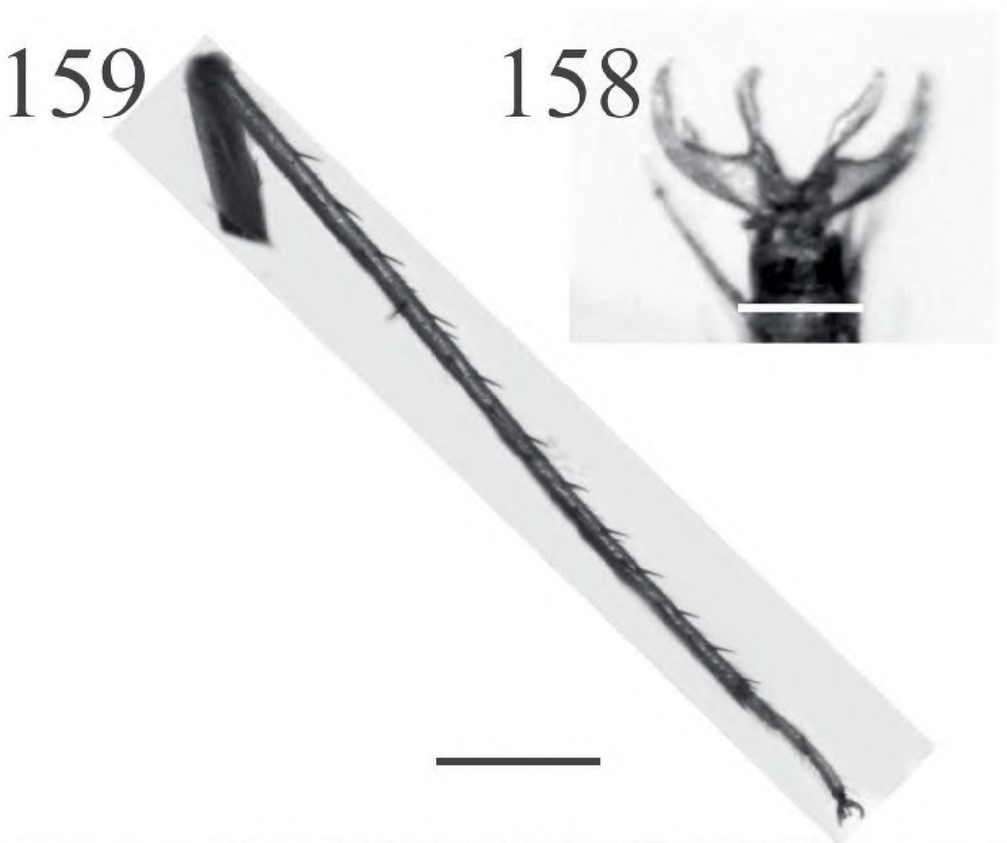
Addition to the original description: The female genitalia of this species, still unknown, are described hereafter for the first time.

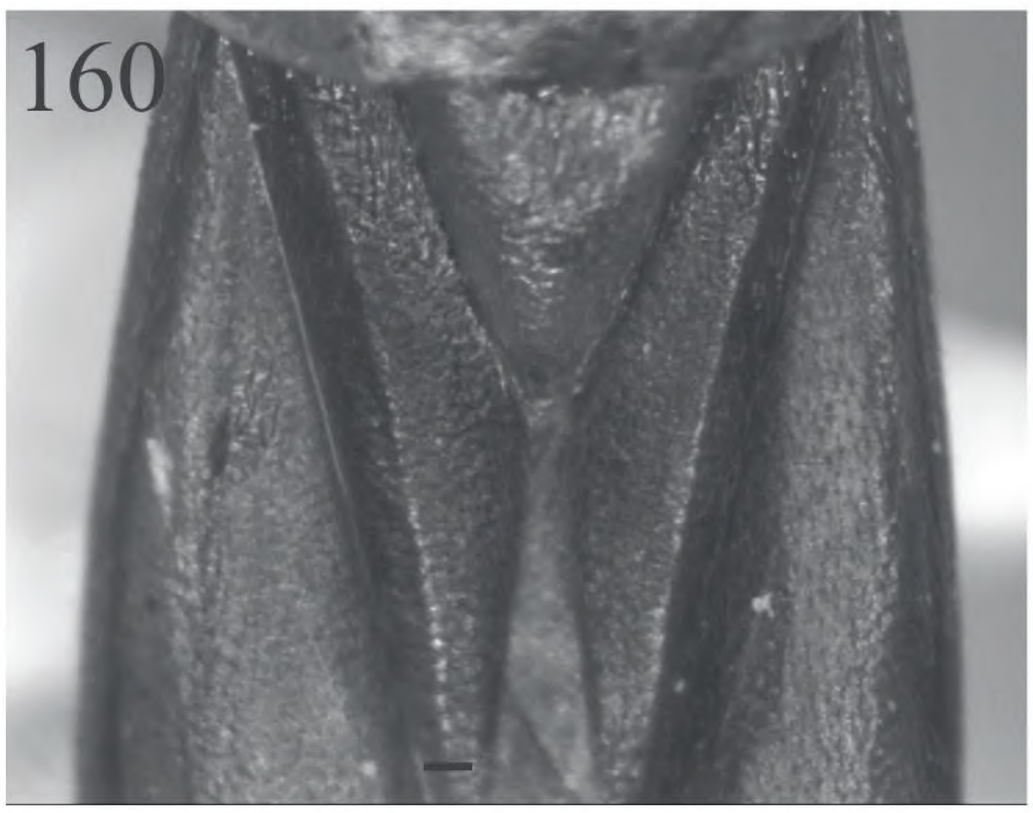
Female genitalia: Seminal depository unknown. Parieto-vaginal rings (Fig. 162, Ap) large, totally separated; anterior margin slightly convex, outer margin convex, posterior margin almost straight, inner margins very short, acute. Dorso-labiate













Figures 155-161. *Waucoris keyensis* (Poppius, 1915a). 155 – Head, lateral view (FC n° 4926); 156 – Mesepimeron and metepisternum (FC n° 4926); 157 – Pronotal surface (FC n° 4926); 158 – Pretarsus and claw (FC n°3865B); 159 – Hind leg (FC n°4919); 160 – Scutellum, clavii and anterior parts of coria, dorsal view (FC n°4921); 161 – Corium and membrane, dorsal view (FC n° 4919) [scale bar 0.1 mm, except figs 159 and 161 scale bar 1 mm].

plate (DLP) wide, its margins unsclerotized. Ventral labiate plate unsclerotised. Posterior wall (Fig. 163) elongate. Inter-ramal sclerites or A structures (As) with slightly concave dorsal margins and strongly convex ventral margins; lateral margins almost straight. B structure (Bs) devoid of posterior plate. Base (or dorsal structure, Ds) subdivided in "plate" and "hat", median process wide; inter-ramal lobes or E structures (ES) small, totally separated from median process. Lateral lobes or H structures absent.

Discussion: *Warrisia huonensis* (Poppius, 1914b) was described on the male holotype from Sattelberg, Huon Gulf, Morobe Province, Papua New Guinea alone. The species occurs widely in south-east Asia and New Guinea. Carvalho (1986a) and Yasunaga et al. (2002) mention numerous specimens from Indonesia [Sumatra and Papua Barat (Swart Valley, Karubaka; Star Mountains; Warris)], Malaysia, Papua New Guinea [between Agamoia and Ailuluai, Fergusson Island, Milne Bay Province; Finisterre Range, Morobe Province; Kandan, New Ireland Island, New Ireland Province; Kandep, Western Highlands Province; Laiagan, Western Highlands; Mapik, East Sepik Province; Missim Mountains, Morobe Province; Mt Kaindi, Morobe Province; Mt Michael, Eastern Higlands Province; Schleitniz Mountains, New Ireland Island, New Ireland Province] and Vietnam.

Hosts: In the Baiteta Forest, *Warrisia huonensis* (Poppius, 1914b) was recorded only once, by light trap, on *Dracontomelum dao* (Anacardiaceae). The closely related species from Japan, *W. deraeocoroides* (Yasunaga et Nakatani, 1998), was recorded from *Daphiphyllum teijsmanni* (Euphorbiaceae) (Yasunaga et al. 2002).

Waucoris Carvalho, 1987b

References: *Waucoris* Carvalho, 1987b: 156, as new genus; Schuh 1995: 971-972, catalogue; Schuh 2002-2013, online catalogue; Chérot & Malipatil 2016: 190-191.

Type species: *Waucoris keyensis* (Poppius, 1915a), original designation.

Redescription: *Waucoris* Carvalho, 1987 as redefined by Chérot & Malipatil (2016) includes wide *Adelphocoris*-like mirine bugs (Plate 18 figs 5-13), frequently shiny, yellow, orange or black, with simple, recumbent, white dorsal pilosity and classical non-*Phytocoris*-like metafemora, devoid of erect stiff black setae on anterior corners of pronotum of females. Endophallic structures complex, including convoluted ACH. Parieto-vaginal rings wide with acute prolongation on postero-outer margin, latero-inner margins very close. Ventral labiate plate always obvious, generally narrowed medially and with acute lateral corners. Pair of toothed medial processes projecting into genitalic chamber, apparently arising from a reinforced part of lateral roof of chamber, partially hidden by dorsal wall (shape of processes apparently species-specific). Posterior wall devoid of H-structure.

Discussion: Carvalho's key (1987b: 156) of *Waucoris* species is difficult to use and even misleading, mainly because he did not sufficiently take account of the intraspecific variability, particularly for Poppius' species *Adelphocoris keyensis*, but also because he included too different bugs in *Waucoris*, which are presently classified in three different genera. We provide hereafter a new key of continental Papuan species of the genus.

Key to *Waucoris* Carvalho, 1987 from mainland New Guinea

1 Hemelytra with two contrasting colours: the clavii, apices excepted, the basal part of coria and a band (or some small patches) along cunei dark brown to black, a wide transversal fascie on coria and apical part of clavii orange, reddish or lutescent (Plate 18 fig. 7). Cunei dark, red-brown or black. Sometimes, the hemelytra of females almost totally orange, reddish or lutescent except for a band (or some small patches) along cunei dark brown to black (Plate 18 figs 5-6). Scutellum generally uniform, orange, reddish, lutescent or red-brown. Pronotum orange, reddish or lutescent frequently with, in the middle, a wide black patch posteriorly .... *Waucoris wauensis* Carvalho, 1987

– Hemelytra widely dark, brown or black, sometimes orange-brown 2

2 Scutellum yellow sometimes with a basal triangular patch or a medial stripe brown or black. The contrast between hemelytra and scutellum colours striking. Pronotum orange with a wide, subtriangular, black or dark brown posterior patch frequently prolongated by a narrow stripe towards the calli (Plate 18 figs 8-9) .... *Waucoris papuanus* (Poppius, 1915)

– Scutellum dark, brown or black, or orange, not or slightly contrasting with the hemelytra 3

3 Dorsal surface dark, reddish-brown to black, almost unicolourous (Plate 18 fig. 10). Endophallus with a convoluted spiculum. Right paramere tiny, with two subapical tips ..... *Waucoris longipes* (Poppius, 1915)

– Dorsal surface of body normally with different colours: hemelytra dark, reddish-brown to black, almost unicolourous, scutellum identical or orange, pronotum orange, orange with a black spot or patch, orange with a medial black stripe or totally black, except for an orange strip on the lateral sides (Plate 18 figs 11-13).





Endophallus complex but devoid of convoluted spiculum. Right paramere large, its apex having one lobe .... *Waucoris keyensis* (Poppius, 1915)

***Waucoris keyensis* (Poppius, 1915a)** (Figs 155-161, 164-165, plate 18 figs 11-13)

Holotype by monotypy ♀ ZMHF: Indonesia: The Moluccas, Kei Kecil Island, Tual: "Mus. Zool. Helsinki Loan n° HE 05-41" / "*A. keyensis* Mirinae 1 Popp. Not *Adelphocoris*" / "*Adelphocoris keyensis* Pop. Det. J.C.M. Carvalho" / "Mus. Zool. Helsinki Loan n° HE 2975" / "Mus. Zool. H:fors Spec. typ. No 10083 *Adelphocoris keyensis* Popp." / "*Adelphocoris keyensis* sp. nov." (manuscript label) / "Holotipo" / "Wien" / "Key Tual, *Rohde*, ex. Coll. H. Fruhstorfer" .

Additional material: Papua New Guinea: Eastern New Britain (Gazelle Peninsula): 1♂ ZMHF: Bismarck Arch, Ralum, Matupi, 02.xi.1896, *Dahl S.* leg., on *Desmodium umbellatum* [15]; Madang: 4♂, 4♀, 1? ISNB: Baiteta, 14.vii.1995, O. Missa leg., on *Neonauclea* sp. (Rubiaceae), fogging (FC n°s 3865a, 4917-4920, 4923-4924, 4926, sans n°); 2♂ ISNB: Baiteta, 02.viii.1995, O. Missa leg., on *Dysoxylum patigravianum* (Melicaceae), fogging (FC n°s 4921-4922); 1♀ ISNB: Baiteta, 1995, O. Missa leg., on *Celtis latifolia* (Ulmaceae), fogging (FC n° 3865b).

References: *Adelphocoris keyensis* Poppius, 1915a: 32, as new species; *Waucoris keyensis*: Carvalho 1987b: 157-159, new combination, redescription, MG; Schuh 1995: 972, catalogue; Schuh 2002-2013, online catalogue; Chérot & Malipatil (2016).

Addition to the original description: Variability as on the plate 18 figs 11-13. Morphology as on Figs 155-161. The female genitalia of this species, still unknown, are described hereafter for the first time.

Female genitalia: Anterior sac unknown. Parieto-vaginal rings (Fig. 164) wide, anterior and latero-inner margins convex, posterior margin slightly concave, latero-outer margin almost straight, postero-outer corners with acute lateral prolongation. Ventro-labiate plate wide and elongate, narrowed medially. Lateral oviducts short and stout. Pair of subtriangular medial process projecting into genital chamber, apparently arising from reinforced part of lateral roof of chamber, partially hidden in dorsal view by dorsal wall. Posterior wall (Fig. 165) with complex B structure (Bs), elongate A and E structures (these later difficult to see) and lateral plates. H structures absent.

Discussion: *Waucoris keyensis* (Poppius, 1915a) was described on the male holotype from Tual alone. Additional specimens were cited by Carvalho (1987b: 159) from Papua New Guinea (Bisianumu, Central Province; Kapagere, near Rigo, Central Province; Kulumadau Hill, Woodlark Island, Milne Bay Province).

Hosts: In the Baiteta Forest, 12 specimens of *Waucoris keyensis* (Poppius, 1915a) were recorded by fogging, in three independent collection events, on three different plants: *Celtis latifolia* (Ulmaceae), *Dysoxylum patigravianum* (Meliaceae) and *Neonauclea* sp. (Rubiaceae).

Notes: The holotype by monotypy is preserved in ZMHF and not in Vienna's Museum ("Mus. Vindob.") as asserted by Poppius (1915a: 32).

***Waucoris longipes* (Poppius, 1915a)** (Figs 168-169, plate 18 fig. 10)

Holotype by monotypy ♂ ZMHF: Papua New Guinea: Morobe: "Mus. Zool. Helsinki Loan n° HE 05-35" / "*A. longipes* ? Mirinae 1 N A close to *Orientomiris*" / "*Adelphocoris longipes* Pop. Det. J.C.M. Carvalho" / "Mus. Zool. H:fors Spec. typ. No 10081 *Adelphocoris longipes* Popp." / "*Adelphocoris longipes* sp. nov." (manuscript label) / "Mus. Zool. Helsinki Loan n° HE 2976" / "Holotipo" / "Sattelberg, Huon Golf" / "N. Guinea, Biro" (= Biró) "1896" (FC n° 4914).

Additional material: Papua New Guinea: Madang: 1♀ ISNB: Baiteta, 08.ii.1995, O. Missa leg., on *Dysoxylum patigravianum* (Meliaceae), fogging (FC n° 3857); Central Province: 1♀ MNRJ: Bisianumu, (north-) east of Port Moresby, 08.vi.1955, Gressitt J. L. leg., primary forest, 500m (FC n° 4264).

References: *Adelphocoris longipes* Poppius, 1915a: 34-35, as new species; *Waucoris longipes*: Carvalho, 1987b: 159, 161, new combination, redescription, MG; Schuh, 1995: 972, catalogue; Schuh 2002-2013, online catalogue; Chérot & Malipatil (2016).

Addition to the original description: The female genitalia of this species, still unknown, are described hereafter for the first time.

Female genitalia: Anterior sac unknown. Parieto-vaginal rings (Fig. 168) wide, anterior margin slightly sigmoid, latero-inner margin convex, posterior margin slightly concave, latero-outer margin almost straight. Ventro-labiate plate wide and elongate, slightly narrowed medially. Pair of short subtriangular medial processes projecting into genitalic chamber, apparently arising from reinforced part of lateral roof of chamber, partially hidden in dorsal view by dorsal wall. Posterior wall (Fig. 169) with complex B structure, pair of elongate

15 *Desmodium umbellatum* is a Fabaceae known from Tropical Africa (notably Zanzibar and Kenya), Madagascar, tropical Asia, including Malaysia and the Philippines, New Guinea and northern Australia.



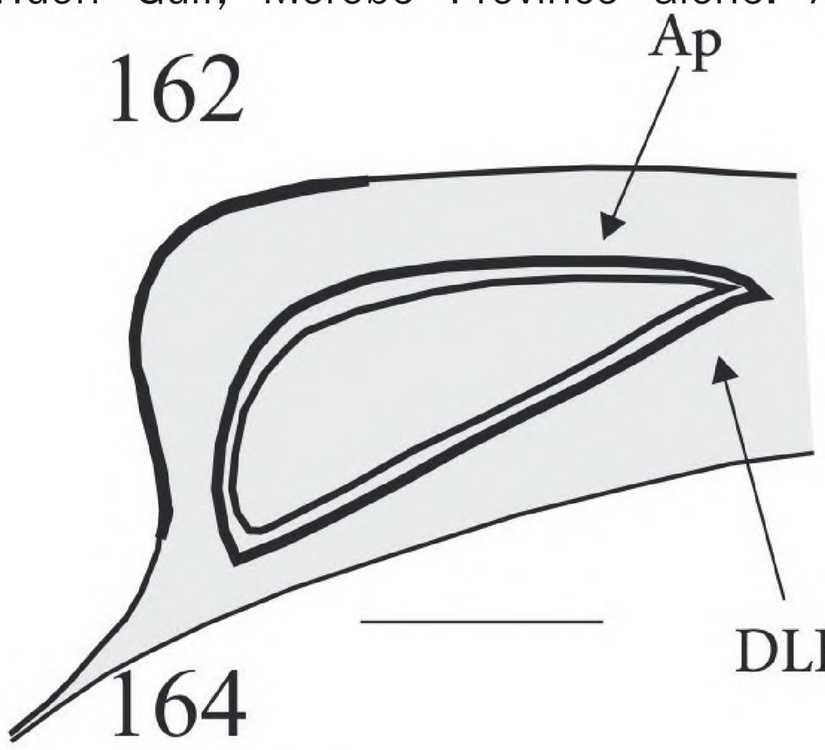


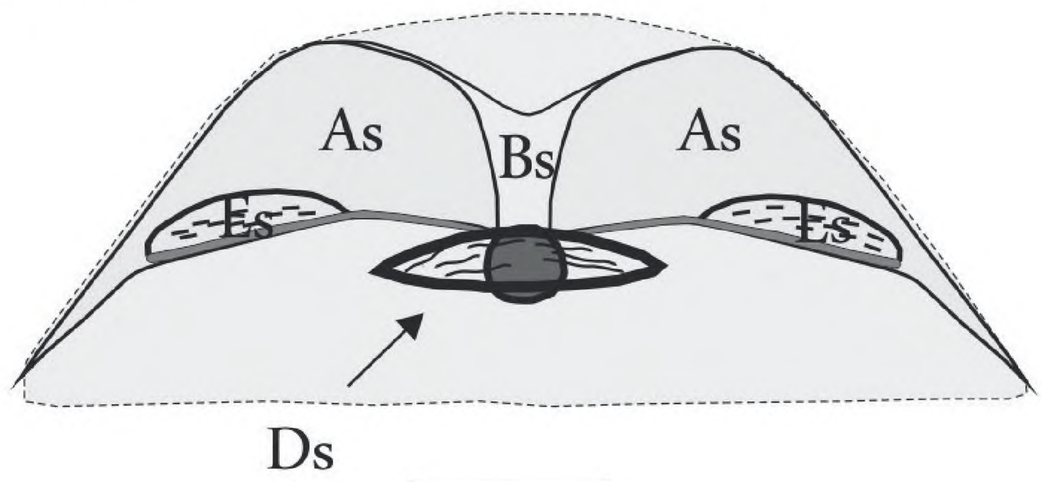


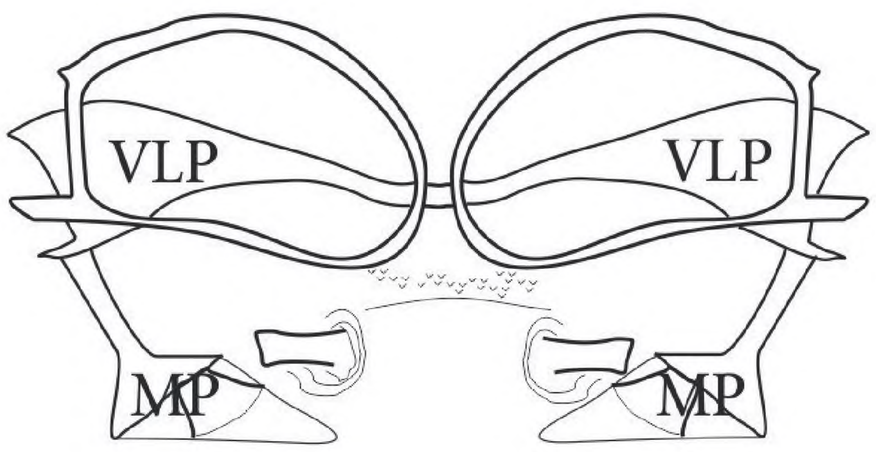


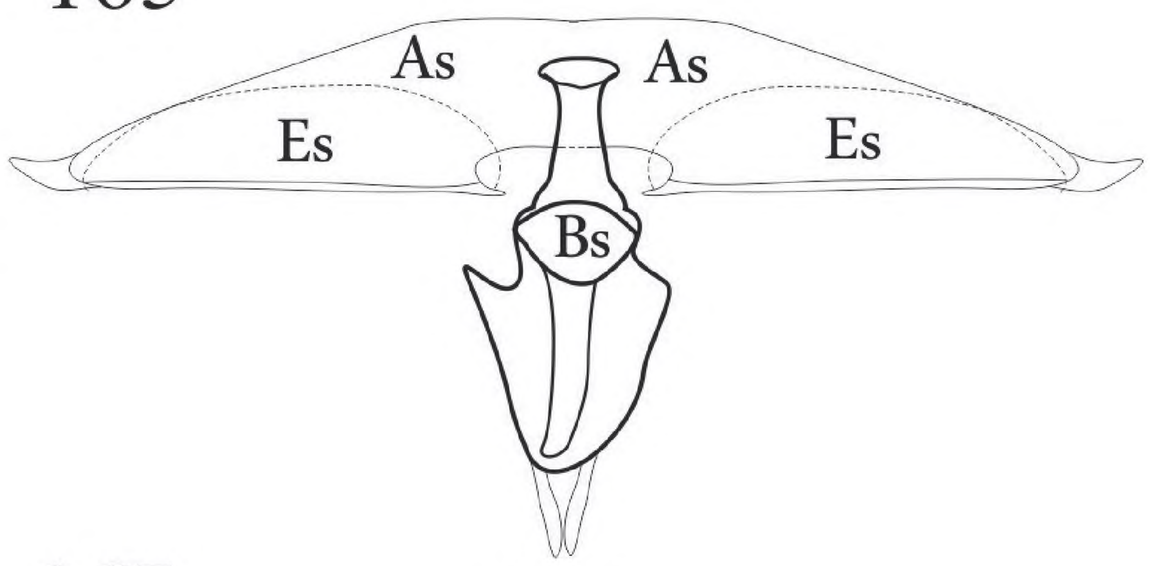
A and E structures and pair of lateral plates. H structures absent.

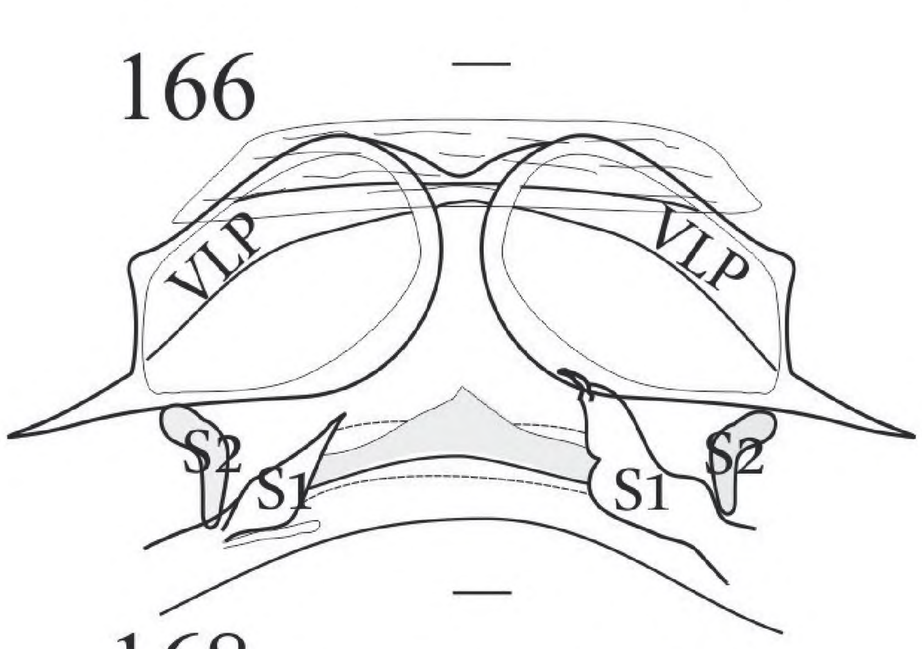
Discussion: *Waucoris longipes* (Poppius, 1915a) was described on the male holotype from Sattelberg, Huon Gulf, Morobe Province alone. Additional specimens were cited by Carvalho (1987b: 161) from Indonesia (Papua Barat: Karubaka, Swart Valley) and from Papua New Guinea (Bisianumu, Central Province; Giluwe Mts, Southern Highlands Province; Betege, 20 km SW of Koroba, Southern

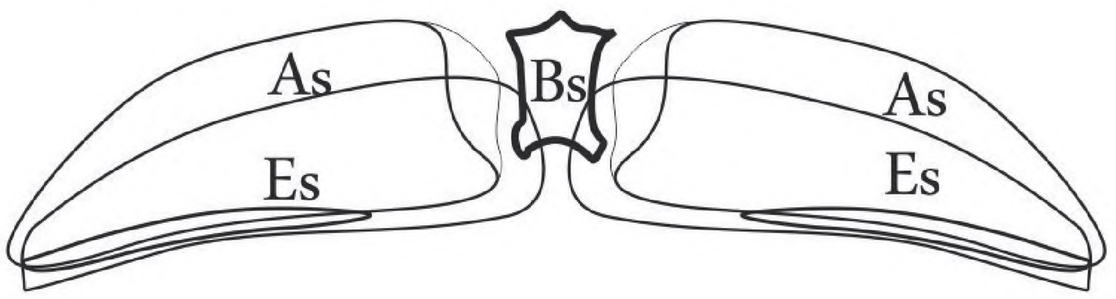


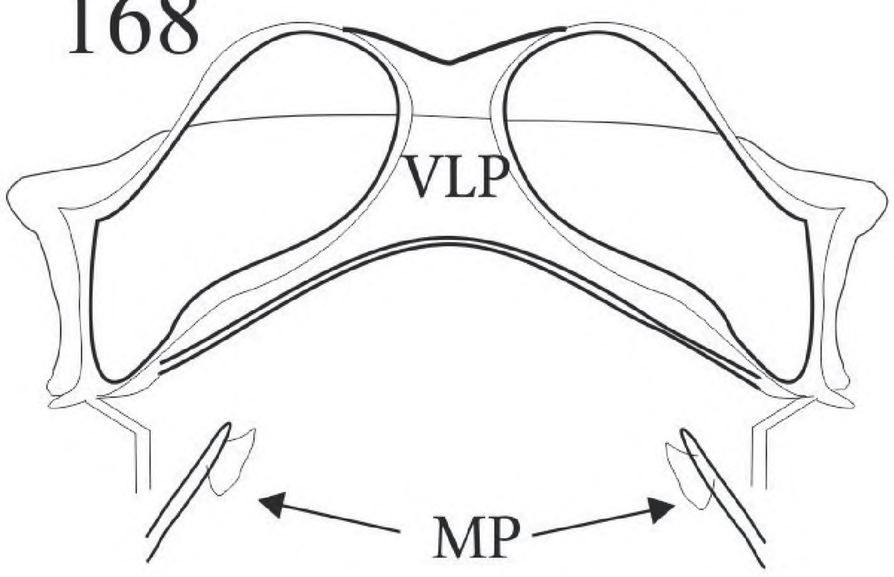


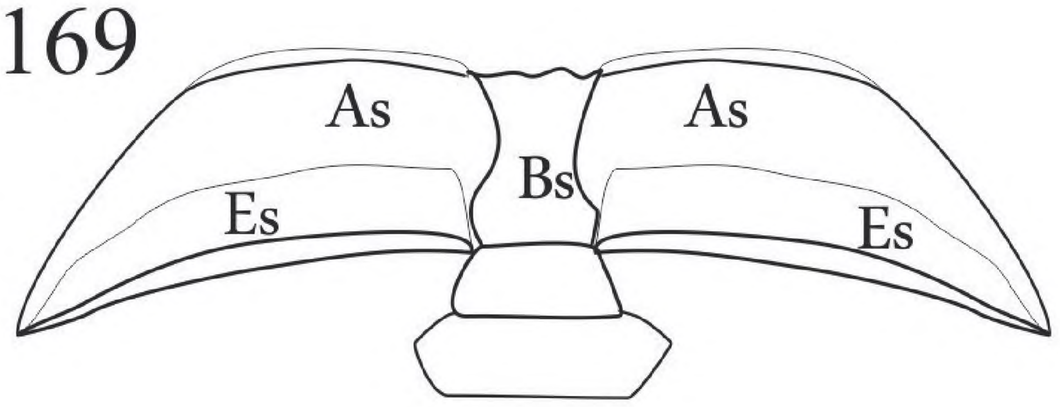












Figures 162-169. *Warrisia huonensis* (Poppius, 1914b) and *Waucoris* species, female genitalia. 162-163 – *Warrisia huonensis* (Poppius, 1914b), left parieto-vaginal rings, dorsal view and posterior wall; 164-165 – *Waucoris keyensis* (Poppius, 1915a), parieto-vaginal rings and posterior wall; 166-167 – *Waucoris papuanus* (Poppius, 1915a), parieto-vaginal rings and posterior wall; 168-169 – *Waucoris longipes* (Poppius, 1915a), parieto-vaginal rings, dorsal view and posterior wall [scale bar 0.1 mm].



Highlands Province; Wau, Morobe Province).
The placement of this species in the genus *Waucoris* remains problematic. "*W.*" *longipes* is similar to several *Orientomiris* species by its elongate, dark habitus, by its double dorsal punctation, one dense, very narrow, shallow, the second wider, erased, difficult to see, by the proeminent veins of the hemelytra, but differs from the *Orientomiris* by the structure of the endophallus and by the smaller size. We were not able to find a genus to correctly accommodate "*W.*" *longipes*. Since we analyse only few specimens of *W. longipes*, because numerous genera of the *Adelphocoris-Creontiades-Megacoelum* complex should be carefully redefined and because a lot of new genera of the complex must still be described particularly from Australia, we prefer to temporarily keep "*W.*" *longipes* in the genus *Waucoris*.
Hosts: In the Baiteta Forest, *Waucoris longipes* (Poppius, 1915a) was recorded only one time, by fogging, on *Dysoxylum patigravianum* (Meliaceae).
Notes: The holotype by monotypy is preserved in ZMHF (Carvalho 1987b: 161 and first author's personal observation) not in HNHM as asserted by Poppius (1915a: 35). The spelling of the species group name as "*longipedes*" (Carvalho 1987b: 156) is an incorrect subsequent spelling.

***Waucoris papuanus* (Poppius, 1915a)** (Figs 166-167, plate 18 figs 8-9)

Holotype by monotypy ♀ ZMHF: Papua New Guinea: Madang: "Mus. Zool. Helsinki Loan n° HE2977" / "*Adelphocoris papuanus* Pop. Det. J.C.M. Carvalho" / "Mus. Zool. H:fors Spec. typ. No 10080 *Adelphocoris papuanus* Popp." / "*Adelphocoris papuanus* sp. nov." (manuscript label) / "Holotipo" / "Erima, Astrolabe B(ay)" / N. Guinea, Biró (18)96".
Additional material: Papua New Guinea: Madang: 1♂ ISNB: Baiteta, 16.iii.1993, O. Missa leg., on *Dracontomelum dao* (Anacardiaceae), light trap FC n° 4927); 1♀ ISNB: Baiteta, 02.vii.1995, O. Missa leg., on *Dysoxylum patigravianum* (Meliaceae), fogging (FC n° 4926); 5♂, 2♀, 1? ISNB: Baiteta, 14.vii.1995, O. Missa leg., on *Neonauclea* sp. (Rubiaceae), fogging (FC n°s 3858-3864, 4925).

References: *Adelphocoris papuanus* Poppius, 1915a: 33, as new species; *Waucoris papuanus*: Carvalho 1987b: 160, 161, new combination, redescription, MG; Schuh 1995: 972, catalogue; Schuh 2002-2013, online catalogue; Chérot & Malipatil 2016.
Addition to the original description: The female genitalia of this species, still unknown, are described hereafter for the first time.

Female genitalia: Anterior sac unkown. Parieto-vaginal rings (Fig. 166) wide, anterior margin slightly sigmoid, latero-inner margin convex, posterior margin and latero-outer margin almost straight, postero-outer corners with acute and elongate lateral prolongation. Ventro-labiate plate wide and elongate, obviously narrowed medially. Pair of elongate and pointed medial processes projecting into genitalic chamber, apparently arising from reinforced part of lateral roof of chamber, partially hidden in dorsal view by dorsal wall. Posterior wall (Fig. 167) with reduced B structure, pair of elongate A and E structures and pair of lateral plates. H structures absent.
Discussion: *Waucoris papuanus* (Poppius, 1915a) was described on the female holotype from Erima, Astrolabe Bay, Madang Province alone. Additional specimens were cited by Carvalho (1987b: 161) from Papua New Guinea (Gabuni village, Finisterre Range, Morobe Province; Goilala, Central Province; Kapagere, near Rigo, Central Province; Mamai, Central Province; Wakaiuna, Normanby Island, Milne Bay Province).
Hosts: In the Baiteta Forest, 10 specimens of *Waucoris papuanus* (Poppius, 1915a) were recorded by fogging and light trap, in three independent collection events, on three different plants: *Dracontomelum dao* (Anacardiaceae), *Dysoxylum patigravianum* (Meliaceae) and *Neonauclea* sp. (Rubiaceae).
Note: The holotype by monotypy is preserved in ZMHF, not in HNHM as asserted by Poppius (1915a: 34).

***Waucoris wauensis* Carvalho, 1987b** (Plate 18 figs 5-7)

Paratypes MNRJ: Papua New Guinea: Northern Province: 1♀: Eliptamin valley, 19.vi.1959, *Brandt W. W.* leg. (FC n°s 4265-4266); 1♀: Eliptamin valley, 16.viii.1959, Brandt W. W. leg. (FC n° 4260).
Additional material 1♂ & 2♀ ISNB: Papua New Guinea: Madang: Baiteta, 14.vii.1995, O. Missa leg., on *Neonauclea* sp. (Rubiaceae), fogging (FC n°s 3854-3856).

References: *Waucoris wauensis*: Carvalho 1987b: 163-164, as new species: description, MG; Schuh 1995: 972, catalogue; Schuh 2002-2013, online catalogue; Chérot & Malipatil 2016.
Discussion: *Waucoris wauensis* Carvalho, 1987b was described on the male holotype from Wau, Morobe Province and 14 paratypes of both sexes from different places in Papua New Guinea (Eliptamin Valley, Northern Province; Foramin (an unidentified place); Matoko village, Finisterre






Range, Morobe Province; Madang, Madang Province; Wanuma, Adelbert Mts, Madang Province; Tifalmin, Western Province; Kunard Creek, Wau, Morobe Province).

Hosts: In Baiteta Forest, 3 specimens of *Waucoris wauensis* Carvalho, 1987 were recorded by fogging, in one collection event, on *Neonauclea* sp. (Rubiaceae). As our females were teneral, their genitalia remain unknown.

Stenodemini Douglas, Scott, 1865

Lasiomiris Reuter, 1891

References: *Lasiomiris* Reuter, 1891: 130, as new genus; Carvalho & Afonso, 1977: 816-814, redescription; Zheng, 1986: 88, redescription; Schwartz, 1987: 228-233, redescription in PhD; Schuh, 1995: 1009-1010, catalogue; Schwartz, 2008: 1186, 1188-1189, redescription; Schuh, 2002-2013, online catalogue.

Type species: *Lasiomiris lineaticollis* Reuter, 1891, by monotypy, a junior synonym of *L. albopilosus* (Lethierry, 1888).

Lasiomiris neoguineanus Carvalho, Afonso, 1977

(Plate 18 fig. 4)

Additional material 4♂ & 3♀ ISNB: Papua New Guinea: Eastern Highlands: Bismarck Range, Iwam Pass, 12.v.1988, host unknown, leg. J. Van Stalle (FC n°s 4065-4072).

References: *Lasiomiris neoguineanus* Carvalho, Afonso, 1977: 816-817, as new species; Schwartz, 1987: 233, citation; Schuh, 1995: 1009, catalogue; Schwartz, 2008: 1189, citation, as "Palaearctic species"; Schuh, 2002-2013, online catalogue.

Discussion: The male genitalia perfectly agree with Carvalho & Afonso's descriptions and drawings (1977: p. 817, figs 24-26).

Note: This species was not recorded from Baiteta Forest.

Discussion

The analysed samples from Baiteta Forest included a total of 50 species of Bryocorinae, Cylapinae, Deraeocorinae and Mirinae. The species richness of this one square kilometer coastal forest represents then approximately 20% of the 247 species presently known from Papua New Guinea (cf. list in table 3). Seven species, i.e. 14% of the Forest's species richness, are described as new in the present work. Nine species, i.e. 18% of the Forest's species richness, were known before ISNB's expeditions just by their name-bearing type. Twelve species, 24% of the Forest's species richness, are new for Papua New Guinea.

Interestingly, all or almost all Papuan species of several genera, such as *Imogen* or *Waucoris*, were found in Baiteta even though some other endemic genera of New Guinea (including Papua Barat) seem totally absent. For example, we did not find any *Cheesmaniella* (4 described species), *Ialibua* (8 described species), *Moroca* (16 described species), *Peltidopeplus* (2 described species) or *Ragwelellus* (11 described species) species in the Baiteta samples.

The majority of the collected species (at least 38/50 i.e. 76%) could be considered endemic to the Papuan zoogeographical subregion (Papua New Guinea, Papua Barat, related islands), absent of Australia or Oriental Region. Because our present knowledge of the Miridae fauna remains limited, these results must nevertheless be analysed with caution.

We provide, mostly for the first time, data about hypothetised host-plants of numerous species (Table 2). The data obtained by light trap (Table 2 part 2) are difficult to interpret. The flight capacity and inclination to flight toward light by individual species is largely unknown, particularly in the tropics, and totally unknown for the Baiteta Forest species. In general, the efficiency of the light trap as the inclination to flight could be species-, sex- and height-dependent (cf. Wheeler 2001: 45). The data obtained by fogging (Table 2 part 1) seem more informative. On the one hand, the majority of species (44/50 i.e. 88%) and the majority of specimens (251/251+155+3 i.e. 61%) were collected, at least partially, by fogging. On the other hand, the origin of the species collected by fogging is very likely the plant (or the plants) submitted to fogging and, we can deduce it is a host for the bug, particularly when numerous specimens of the same species were collected on the same plant during different collection events. Thus, *Chisocheton ceramicus* is presumed to be a host-plant for *Carpinterocoris brailovskyi* gen. nov., sp. nov. Fifteen specimens of the eccritotarsine were collected by fogging on the *Chisocheton* during three different collection events (and just two specimens on *Celtis latifolia* and two on an unknown plant). Even when only one collection event is available, if the number of collected specimens is high, we could consider having relevant indications about host. For example, the presence of 25 *Argenis incisuratus* in a sample from *Dysoxylum patigravianum* is probably not









accidental. Unfortunately, the other cases remain more difficult to interpret. In our "Taxonomy" section and in our table 2 we mention all plants as host-plants, even if the feeding and oviposition habits of the studied mirid lack confirmation by direct observation.

The mean number of identified host-plants by Miridae species collected by fogging in Baiteta Forest is slightly greater than 2. Some species of Miridae have up to 7 hypothetised hosts (*Guisardus strigicollis*). This figure could seem high, however several of those species are probably generalist predators and some other could be unspecialised zoophytophagous plant bugs. Generalist predator feeding habits could also explain similar results with light traps, particularly in *Fulvius* species. Some plant species are apparently particularly attractive for mirids: *Neonauclea* sp. harbours 25% of the species collected by fogging, *Chisocheton ceramicus* harbours 18% and *Dysoxylum patigravianum* harbours 16%.

Some mirid species were collected only by fogging (such *Carpinterocoris brailovskyi* gen. nov., sp. nov. or *Garainamiris antennatus*), and others only by light trap (such *Fulvius constanti*, *F. subnitens* or *Prolygus ehannoi* sp. nov.).

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Appendix:

Table 1. Sampling localities of specimens cited as examined in the work, with their geographical coordinates.

Country	Islands / Region	Department / Province	Locality	S	E	N	O	References (code of)	Remark (code of)
Australia	–	Queensland	Big Mitchell Creeck, Mareeba-Mooly Road	16°48’	145°21’	–	–	2	1
Australia	–	Queensland	Kuranda	16°49’	145°38’	–	–	2	
Australia	New South Wales		Penrith, Norton’s Bassin	33°45’	150°41’	–	–	2	
China (PR)	Hainan		Ta-Han		?	?		–	16
Congo(DR)		Lualaba	Ruwé	10°28’	25°38’	–	–	2	
French Polynesia	Tahiti	Clipperton	Mahina	17°30’	–	–	149°27’	2	
India		Meghalaya	Balpakram NP, Garo Hill	–	90°51’	25°11’	–		
Indonesia	Papua Barat	Cenderawasih, Doberai	Kebar Valley	00°38’	133°07	–	–	2	2
Indonesia	Papua Barat		Bodem, 11 km SE Oerberfaren	02°20’	138°56’	–	–	1, 2, 7	3
Indonesia	Papua Barat		War(r)is, S. of Hollandia	03°13’	140°58’	–	–	2	
Indonesia	Papua Barat		Swart Valley, Karubaka	03°35’	138°30’	–	–	3	
Indonesia	Java (west)		Tjinjiruan, Malabar Gebirge	07°07’	107°39’	–	–	2	4
Indonesia	Moluccas	Kei Kecil	Tual	05°38’	132°44’	–	–	2	5
Indonesia	Moluccas	Morotai	–	–	128°26’	02°19’	–	2	6
Indonesia	Sulawesi	South Sulawesi	Bua-Kraeng	03°04’	120°13’	–	–	4ter	
Indonesia	Moluccas	Ternate		0°48’	127°19’			2	
Ivory Coast			Bingerville	–	–	05°21’	03°53’	2	7
Japan	Honshu	Okayama	Mt. Kenashi, Shinjo	–	133°33’	35°12’	–	2, 12	
Japan	Honshu	Wakayama	Hatenashi	–	135°43’	33°54’	–	2, 12	8
Japan	Honshu	Hiroshima	Geihoku, Kitahiroshima	–	132°31’	34°40’	–	2, 12	
Japan	Honshu	Aomori	Yokouchi-Yaegiku, Aomori	–	140°44’	40°49’	–	2, 12	9
Japan	Ryukyu	Amami-Oshima	Yuwan-Dake, Uken-Son	–	129°19’	28°17’	–	2, 12	
Papua New Guinea	New Britain	Eastern New Britain	Ralum, Matupi, Gazelle Peninsula	04°14’	152°10’	–	–	2	
Papua New Guinea	New Ireland	–	Kandan	03°13’	151°57’	–	–	9	
Papua New Guinea		Central	Bisianumu	08°43’	147°25’	–	–	2	
Papua New Guinea	Central		Moroka	09°25’	147°41’	–	–	5, 6, 8, 13	10
Papua New Guinea	Central		Owen Stanley Range, Golalai, Tapini	08°22’	146°59’	–	–	2	11
Papua New Guinea	East Sepik		Amok	03°35’	142°50’	–	–	3	
Papua New Guinea	East Sepik		Lemien, Berlinhafen	03°14’	142°20’	–	–	2, 4bis, 14	11bis
Papua New Guinea	Eastern Highlands		Iwam Pass, Bismarck Range	05°50’	145°08’	–	–	2	
Papua New Guinea	Madang		Baiteta	05°01’	145°45’	–	–	our data	
Papua New Guinea	Madang		Erima, Astrolabe Bay	05°24’	145°44’	–	–	2	
Papua New Guinea	Madang		Mandy Passage	04°12’	144°55’	–	–	2	12
Papua New Guinea	Madang		Simbai, Bismarck Range	05°12’	144°23’	–	–	6	
Papua New Guinea	Madang, Hansa Bay		Sisimangun village	04°08’	144°50’	–	–	2	
Papua New Guinea	Madang		Wanuma	04°53’	145°18’	–	–	2	
Papua New Guinea	Milne Bay		Alotau	10°18’	150°27’	–	–	2	13
Papua New Guinea	Morobe		Wau	07°20’	146°43’	–	–	7	14
Papua New Guinea	Morobe, Huon Gulf		Bulolo	07°11’	146°38’	–	–	2	
Papua New Guinea	Morobe, Huon Gulf		Finschhafen	06°36’	147°51’	–	–	2	
Papua New Guinea	Morobe, Huon Gulf		Mt. Kaindi	07°21’	146°40’	–	–	2, 7	
Papua New Guinea	Morobe, Huon Gulf		Sattelberg	06°29’	147°45’	–	–	2	
Papua New Guinea	Morobe, Huon Gulf		Simbang	06°34’	147°50’	–	–	2	
Papua New Guinea	Northern		Biniguni	09°38’	149°18’	–	–	2	
Papua New Guinea	Northern		Eliptamin	05°02’	141°40’	–	–	2	
Papua New Guinea	Northern		Kokoda	08°53’	147°45’	–	–	7	
Papua New Guinea	Northern		Lamington Mt	08°55’	148°09’	–	–	2	
Papua New Guinea	Northern		Pitoki, Kokoda	08°54’	147°44’	–	–	2, 7	
Papua New Guinea		Southern Highlands	Kepilam	03°13’	142°40’	–	–	10	
Papua New Guinea		Western	Kiunga	06°04’	141°18’	–	–	2	
Papua New Guinea	Woodlark	Milne Baa	Kulumadau	09°05’	152°42’	–	–	2	
Philippines	Luçon	Ifugao	Liwo, 8 km E. Mayoyao	–	121°15’	16°58’	–	2	
Philippines	Luçon	Laguna	Los Baños	–	121°12’	14°10’	–	2	15
Philippines	Negros		Camp Lookout, Dunagete	–	?	?	–	–	16
Seychelles	Mahé	Mt. Fleuri	Mt. Fleuri	04°38’	55°37’	–	–	2	
Seychelles	Praslin		Praslin	04°19’	55°41’		–	2	
Sri Lanka		Kanda Ela	Reservoir, 5-6 min S.O. Nuwara Elyia	–	80°45’	06°57’	–	2	
Sri Lanka			Maskelyia	–	80°34’	06°50’	–	2	
Sri Lanka			Peradenyia	–	80°36’	07°15’	–	2	
Sri Lanka			Ohyia		80°49’	06°49’		2	
Sri Lanka			Uva	–	81°14’	06°57’	–	2	
Tanzania			Langenburg	10°28’	34°35’	–	–	11	17
Thailand			Bangkok	–	100°28’	13°43’	–	2	18
Vietnam		Lang Son	Mau So’n Mountains	–	106°53’	21°50’	–	2	19






References to the Table 1 of the Appendix: 1: Gentili (1980: 391); 2: Google Earth; 3: Kohout (2007: 233); 4: Kraus & Allisson (2006: 204); 4bis: Lucky & Sarnat (2008: 38, table 1); 4ter: Melder (1999: 10, table 1); 5: So (2000: 430); 6: Tan et al. (2005: 232); 7: Van Doesburg (2004: Appendix, pp. 108-110); 8: Zimmerman (1967: 192) [all papers available online]; 9: according to http://www.keskeces.com/villes/papouasie/new-ireland/kandan.htm ; 10: according to http://ww2.bgbm.org/herbarium/Access.cfm?Col=4&IsoCode=all& Fam=MARATTIACEAE&SubColl=Farnherbar&Genus= all&FullNameCache=all; 11: according to Pesenko & Pauly (2005: 154) and Pauly in http://www.atlashymenoptera.net/page.asp?id=94; 12: personal information from T. Yasunaga. 13: personal information from D. Polhemus. 14. Setliff (2007: 289-296) provides several maps and lists including some mountains, mountains ranges and localities from Irian Jaya and Papua New Guinea, with several old names (unfortunately, lacking of accurate coordinates).

Remarks: 1: values for Big Mitchell Creeck Reserve; 2: Approximate values, corresponding to Kebar; 3: Doubtful coordinates. The labels bear “Nete (probably an abbreviation for Netherlands), Vogelkop, Boden (or Bodem), 11km south-east of Oberfaren (or Oerberfaren or Orberfaeren)”. Identification of this place is uneasy. The coordinates for Bodem (01°58’S, 138°54’E) according to Gentili (1980: 391), confirmed by Van Doesburg (2004: 108), do not correspond to the Vogelkop Peninsula (130°36’S – sic! -, 134°14’E according to Van Doesburg, op. cit.: 110; indicated by Setliff, op. cit. on his third map, p. 294, number 14) but to the northern coast of mainland Papua Barat (= Irian Jaya) and the coordinates given by Van Doesburg (2004: 109) for Oerberfaren (02°16’S, 138°50’) do not put this last place to eleven kilometres of (his) Bodem. According to D. Polhemus (in litt.), Oberfaren could be somewhere in the hills south of Lake Sentani (about 02°36’S, 140°33’E) that extend to the eastern flanks of the Mamberamo Basin, near Jayapura; 4: Approximate values for Malabar volcano near Malabar town; 5: Approximate values: Tual is a town of Tual Islands used as reference, because the label only give the following information, difficult to interpret: “Key Tual”. Maybe “Key” corresponds to cities of “Kai Ketjil” or “Kai Dulah”, each in different parts of the island; 6: Approximate values: the label provided only the island name; 7: Approximate values: Bingerville is relatively large city; 8: Approximate value for Hatenashi-sammyakuhe. The Hatenashi mountains range consisting of Wada forest (1049m), Mt. Ando (1183.7m), Mt. Kuroo (1235m), Mt. Hiyamizu (1269.9m) and Mt. Ishijiriki (1139.5m); 9: Approximate values for Aomori city; 10: Specimens collected by Lamberto Loria (1855-1913), an Italian ethnologist and explorer, at Moroka are very frequently cited, however the place is surprisingly difficult to identify. Zimmerman (1967: 192), undecided, wrote “There is a note on a “cotype” [of *Imathia brevis*, a Curculionidae] examined that states that Moroka is in SE New Guinea, and S. Dillon Ripley has told me that it is possible that this is a locality on a trail that extends from Port Moresby to the north coast of Papua”. Both So (2000: 430) and Tan et al. (2005: 232) included Moroka in the “Moresby Province”, but they gave no reference or coordinates. Fortunately, Kraus & Allisson (2006: 204) are more accurate, but their coordinates could differ from Loria’s collecting place, the altitude given on the labels of insects collected by Loria is 1300m, but the altitude corresponding to Kraus & Allisson’s coordinates is only 300 m. According to D. Polhemus (in litt.), “Moroka lies at 09°25’S, 147°41’E. Loria collected here for the Genoa Museum from July to September 1893”. The altitude of this area ranges between 300 and 400m. Consequently, the altitude cited on the label could be wrong; 11: Approximate values: values of Tapini; 11bis: approximate values for Aitape (= Berlinhafen), not for Lemien Forest; 12: Approximate values corresponding to the sea passage; 13: Approximate values, Alotau being a city; 14: The coordinates for Wau according to Van Doesburg (2004: 110). Amazingly, by default, Google Earth gives another (smaller) Wau; 15: Approximate values, Los Baños being a relatively large city. 16: unidentified place. 17: Tanzania, shore of Lake Malawi, for additional information cf. text, footnote number 9. 18: approximate values, Bangkok being a large city. 19: Approximate value.



Table 2 part 1. Number of specimens of Miridae species collected by fogging on each plant in Baiteta Forest with statistics.

Unknown																										
Number of cited identified by Miridae species																										
Percent by fogging																										
Total number																										
Unknown																										
Sapindaceae																										
Tristiropsis acutangula																										
Flacourtiaceae																										
Trichadenia philippinensis																										
Combretaceae																										
Terminalia sepikana																										
Myrtaceae																										
Syzigium sp.																										
Elaeocarpaceae																										
Sloanea sogeriensis																										
Elaeocarpaceae																										
Sloanea forbesii																										
Rubiaceae																										
Sarcocephalus sp.																										
Sapindaceae																										
Pometia pinnata																										
Fabaceae																										
Piteleocarpus indicus																										
Rubiaceae																										
Neonauclea sp.																										
Liliaceae																										
Litsea irianensis																										
Burseraceae																										
Haplolobus sp.																										
Moraceae																										
Ficus sp.																										
Moraceae																										
Ficus polyantha																										
Meliaceae																										
Dysoxylum patigravianum																										
Anacardiaceae																										
Dracontomelum dao																										
Meliaceae																										
Chisocheton welandia																										
Meliaceae																										
Chisocheton ceramicus																										
Ulmaceae																										
Celtis philippinensis																										
Ulmaceae																										
Celtis latifolia																										
Anacardiaceae																										
Buchaniana heterophylla																										
Moraceae																										
Artrocarpus incisus																										
Moraceae																										
cf. *Artrocarpus* sp.																										
Adelphocorisella brunnescens	0	0	0	0	0	0	1	0	0	0	0	0	0	2	7	0	0	0	0	0	0	0	1	3	14	82	4
Apolygus sp.	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	17	1
Araspus gressitti	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	50	0
Argenis incisuratus	0	2	0	0	1	2	0	3	25	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4	38	69	6
Aristopeplus imperialis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baitetacoris turschi	0	0	0	0	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	7	100	2
Bakeriola sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	100	0
Bertsa lankana	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	20	1
Bironiella metallescens	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	100	1
Bironiella ruberonotata	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	100	1
Bothriomiris sp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	100	0
Bromaeliaemiris morobensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bryocorellisca pilosa	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	100	2
Carpinterocoris brailovsky	0	0	0	3	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	19	100	2
Cylapofulvius punctatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diognetus intonsus	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	100	1
Eurystylus costalis	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	1	0	6	67	2
Eurystylus sp. 2 near *minutus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	100	0
Fingulus novobritanicus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fingulus sp.	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	2	100	1
Fulvius constanti	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fulvius nigricornis	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100	1
Fulvius pallidus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fulvius stysi	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	100	1
Fulvius subnitens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	11	1
Fulvius variegatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Garainamiris antennatus	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	1	12	100	3
Guisardinus papuensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	100	0
Guisardus strigicollis	0	0	0	0	1	1	0	7	0	0	1	0	0	0	0	3	0	0	0	0	0	0	6	34	53	54	6
Harpedona gressitti	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	100	1
Hyalopeplinus papuensis	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	11	100	1
Hyalopeploides cyanescens	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	100	1
Hyalopeplus similis	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	63	1
Imogen bicolor	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100	1
Imogen fasciatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Imogen papuensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	100	1






Table 2 part 1 (continued)

	Unknown																									Number of cited identified by Miridae species	Percent by fogging	Total number of plants
	Unknown																											
	Sapindaceae																											
	Flacourtiaceae																											
	Combretaceae																											
	Myrtaceae																											
	Elaeocarpaceae																											
	Elaeocarpaceae																											
	Rubiaceae																											
	Sapindaceae																											
	Fabaceae																											
	Rubiaceae																											
	Liliaceae																											
	Burseraceae																											
	Moraceae																											
	Moraceae																											
	Meliaceae																											
	Anacardiaceae																											
	Meliaceae																											
	Meliaceae																											
	Ulmaceae																											
	Ulmaceae																											
	Anacardiaceae																											
	Moraceae																											
	Moraceae																											
“Lygus” incertae sedis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	100	0
Missacoris sigwaltae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	100	0
Nabireocoris minutus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	100	0
Palaucoris novaguineae	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	100	1
Peritropis graziae	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100	1
Peritropis sulawesica	0	0	0	0	0	0	0	0	0	0	5	0	0	1	0	0	0	0	0	0	0	0	0	1	7	88	2
Prodromus oculatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prolygus ehannoi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prolygus erimensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prolygus cf. *femoralis*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	5	19	2
Prolygus polhemusorum	0	0	0	0	0	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	83	2
Sabactiopus zhengi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	100	0
Tinginotopsis camelus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	100	0
Tinginotum knowlesi	0	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6	40	2
Vanniusoides brevis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	100	1
Warrisia huonensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waucoris keyensis	0	0	0	1	0	0	0	0	2	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	12	100	3
Waucoris longipes	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100	1
Waucoris papuanus	0	0	0	0	0	0	0	0	1	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	9	90	2
Waucoris wauensis	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	3	100	1
Total number of Miridae specimens by plant	1	11	0	6	9	25	2	15	32	1	9	1	1	42	7	3	2	0	1	0	0	0	20	63	251		
Percent of the total Miridae specimens collected by fogging found on each plant	0.4	4.4	0	2.4	3.6	10	0.8	6	13	0.4	3.6	0.4	0.4	17	2.8	1.2	0.8	0	0.4	0	0	0	8	25	100		
Percent for all methodologies	0.2	2.7	0	1.5	2.2	6.1	0.5	3.7	7.9	0.2	2.2	0.2	0.2	10	1.7	0.7	0.5	0	0.2	0	0	0	4.9	15	62		
Total number of Miridae species by plant	1	4	0	3	5	7	2	3	7	1	4	1	1	10	1	1	2	0	1	0	0	0	6				
Percent of the total Miridae species collected by fogging found on each plant	2.3	9.1	0	6.8	11	16	4.5	6.8	16	2.3	9.1	2.3	2.3	23	2.3	2.3	4.5	0	2.3	0	0	0	14				



Table 2 part 2. Number of specimens of Miridae species collected by light trap on each plant in Baiteta Forest with statistics.

Number of cited identified plants																					
Percent by light trap																					
Total number																					
Unknown																					
Unknown																					
Sapindaceae																					
Tristiropsis acutangula																					
Flacourtiaceae																					
Trichadenia philippinensis																					
Combretaceae																					
Terminalia sepikana																					
Sapindaceae																					
Pometia pinnata																					
Rubiaceae																					
Neonauclea sp.																					
Liliaceae																					
Litsea irianensis																					
Burseraceae																					
Haplolobus sp.																					
Moraceae																					
Ficus sp.																					
Moraceae																					
Ficus polyantha																					
Meliaceae																					
Dysoxylum patigravianum																					
Anacardiaceae																					
Dracontomelum dao																					
Meliaceae																					
Chisocheton welandia																					
Meliaceae																					
Chisocheton ceramicus																					
Ulmaceae																					
Celtis philippinensis																					
Ulmaceae																					
Celtis latifolia																					
Anacardiaceae																					
Buchaniana heterophylla																					
Moraceae																					
cf. *Artrocarpus* sp.																					
Adelphocorisella brunnescens	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0	3	18	3
Apolygus sp.	0	0	0	0	1	0	0	0	0	0	0	0	0	3	0	0	0	1	5	83	2
Araspus gressitti	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argenis incisuratus	0	0	0	0	0	0	11	0	0	0	0	0	0	5	0	0	0	1	17	31	2
Aristopeplus imperialis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	100	0
Baitetacoris turschi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bakeriola sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bertsa lankana	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0	1	4	80	2
Bironiella metallescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bironiella ruberonotata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bothriomiris sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromaeliaemiris morobensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	100	1
Bryocorellisca pilosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carpinterocoris brailovsky	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cylapofulvius punctatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diognetus intonsus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eurystylus costalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	33	0
Eurystylus sp. 2 near *minutus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fingulus novobritanicus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	100	0
Fingulus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fulvius constanti	0	0	0	2	0	0	3	0	0	1	0	0	0	0	0	1	0	1	8	100	4
Fulvius nigricornis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fulvius pallidus	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	100	2
Fulvius stysi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fulvius subnitens	0	0	0	2	0	0	3	0	0	1	0	0	0	0	0	1	0	1	8	89	4
Fulvius variegatus	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	3	100	2
Garainamiris antennatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Guisardinus papuensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Guisardus strigicollis	0	0	0	4	20	0	1	0	0	0	0	0	0	0	0	0	0	21	46	46	3
Harpedona gressitti	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hyalopeplinus papuensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hyalopeploides cyanescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hyalopeplus similis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	38	0
Imogen bicolor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Imogen fasciatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Imogen papuensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
"Lygus" incertae sedis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Missacoris sigwaltae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nabireocoris minutus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palaucoris novaguineae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peritropis graziae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peritropis sulawesica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	13	0
Prodromus oculatus	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100	1
Prolygus ehannoi.	0	2	0	1	3	0	1	0	0	0	0	0	0	5	0	0	0	0	12	100	5
Prolygus erimensis	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100	1
Prolygus cf. *femoralis*	0	0	0	1	4	0	2	0	0	0	0	0	0	7	1	0	0	6	21	81	5
Prolygus polhemusorum	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	17	1
Sabactiopus zhengi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tinginotopsis camelus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tinginotum knolwesi	0	0	0	0	1	0	0	0	0	0	0	0	0	6	0	0	0	2	9	60	2
Vanniusoides brevis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Warrisia huonensis	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	100	1
Waucoris keyensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waucoris longipes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waucoris papuanus	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	10	1
Waucoris wauensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total number of Miridae specimens by plant	0	2	0	12	31	0	26	1	0	2	0	0	0	30	2	3	0	44	153		
Percent by catching methodology	0	1.31	0	7.843	20.26	0	17	0.7	0	1.3	0	0	0	20	1.3	2	0	29	100		
Percent for all methodologies	0	0.49	0	2.948	7.617	0	6.39	0.2	0	0.5	0	0	0	7.4	0.5	0.7	0	11	38		
Total number of Miridae species by plant	0	1	0	7	7	0	11	1	0	2	0	0	0	8	2	3	0				
Percent by catching methodology	0	4.35	0	30.43	30.43	0	47.8	4.3	0	8.7	0	0	0	35	8.7	13	0				






Table 2 part 3. Number of specimens of Miridae species collected by sweeping or by an unknown methodology on each plant in Baiteta Forest with statistics.

	Elaeocarpaceae			
	Sloanea sogeriensis	Unknown	Total number	Percent by sweeping or by unknown methodology
Adelphocorisella brunnescens	0	0	0	0
Apolygus sp.	0	0	0	0
Araspus gressitti	1	0	1	50
Argenis incisuratus	0	0	0	0
Aristopeplus imperialis	0	0	0	0
Baitetacoris turschi	0	0	0	0
Bakeriola sp.	0	0	0	0
Bertsa lankana	0	0	0	0
Bironiella metallescens	0	0	0	0
Bironiella ruberonotata	0	0	0	0
Bothriomiris sp	0	0	0	0
Bromeliaemiris morobensis	0	0	0	0
Bryocorellisca pilosa	0	0	0	0
Carpinterocoris brailovsky	0	0	0	0
Cylapofulvius punctatus	0	1	1	100
Diognetus intonsus	0	0	0	0
Eurystylus costalis	0	0	0	0
Eurystylus cf minutus	0	0	0	0
Fingulus novobritanicus	0	0	0	0
Fingulus sp.	0	0	0	0
Fulvius constanti	0	0	0	0
Fulvius nigricornis	0	0	0	0
Fulvius pallidus	0	0	0	0
Fulvius stysi	0	0	0	0
Fulvius subnitens	0	0	0	0
Fulvius variegatus	0	0	0	0
Garainamiris antennatus	0	0	0	0
Guisardinus papuensis	0	0	0	0
Guisardus strigicollis	0	0	0	0
Harpedona gressitti	0	0	0	0
Hyalopeplinus papuensis	0	0	0	0
Hyalopeploides cyanescens	0	0	0	0
Hyalopeplus similis	0	0	0	0
Imogen bicolor	0	0	0	0
Imogen fasciatus	0	1	1	100
Imogen papuensis	0	0	0	0
"Lygus" incertae sedis	0	0	0	0
Missacoris sigwaltae	0	0	0	0
Nabireocoris minutus	0	0	0	0
Palaucoris novaguineae	0	0	0	0
Peritropis graziae	0	0	0	0
Peritropis sulawesica	0	0	0	0
Prodromus oculatus	0	0	0	0
Prolygus ehannoi	0	0	0	0
Prolygus erimensis	0	0	0	0
Prolygus cf. *femoralis*	0	0	0	0
Prolygus polhemusorum	0	0	0	0
Sabactiopus zhengi	0	0	0	0
Tinginotopsis camelus	0	0	0	0
Tinginotum knowlesi	0	0	0	0
Vanniusoides brevis	0	0	0	0

Table 2 part 3 (continued). Number of specimens of Miridae species collected by sweeping or by an unknown methodology on each plant in Baiteta Forest with statistics.

	Elaeocarpaceae			
	Sloanea sogeriensis	Unknown	Total number	Percent by sweeping or by unknown methodology
Warrisia huonensis	0	0	0	0
Waucoris keyensis	0	0	0	0
Waucoris longipes	0	0	0	0
Waucoris papuanus	0	0	0	0
Waucoris wauensis	0	0	0	0
Total number of Miridae specimens by host plant	1	2	3	
Percent by catching methodology	33.3	66.7	100	
Percent for all methodologies	0.25	0.49	0.737	
Total number of Miridae species by host plant	1			
Percent by catching methodology	33.3			
Total number of Miridae species by catching method	1			
Percent for all methodologies	1.49			






Table 3. List of Bryocorinae, Cylapinae, Deraeocorinae and Mirinae from Papua New Guinea.

Legends: * – species cited from Papua New Guinea for the first time; **bold** – species present in Baiteta Forest samples; all taxa are arranged alphabetically.

Abbreviations of authors: C. – Carvalho; S. & Ca. – Stonedahl & Cassis; Sch. in Ch. – Schwartz, Chérot et Malipatil in Chérot, Malipatil et Schwartz; ** – sensu Carvalho & Lorenzato 1978.

Subfamily	Tribe	Species
Bryocorinae	Bryocorini	*Hekista albicollaris* C., 1981a
Bryocorinae	Bryocorini	*Hekista papuensis* C., 1981a
Bryocorinae	Bryocorini	*Hekista similaris* C., 1981a
Bryocorinae	Bryocorini	*Monalocoris nigrus* C., 1981a
Bryocorinae	Bryocorini	*Monalocoris pallipes* C., 1981a
Bryocorinae	Eccritotarsini	*Ambunticoris nigroemboliatus* C., 1981a
Bryocorinae	Eccritotarsini	*Ambunticoris ochraceus* C., 1981a
Bryocorinae	Eccritotarsini	*Bromeliaemiris fasciatus* (Ghauri, 1975)
Bryocorinae	Eccritotarsini	*Bromeliaemiris gressitti* C., 1981a
Bryocorinae	Eccritotarsini	***Bromeliaemiris morobensis* C., 1981a**
Bryocorinae	Eccritotarsini	*Bromeliaemiris rubrinus* C., 1981a
Bryocorinae	Eccritotarsini	*Bryocorellisca novaguineae* C., 1981a
Bryocorinae	Eccritotarsini	*Bryocorellisca pallidoemboliata* C., 1981a
Bryocorinae	Eccritotarsini	***Bryocorellisca pilosa* C., 1981a**
Bryocorinae	Eccritotarsini	*Carinimiris lustrosus* C., 1981a
Bryocorinae	Eccritotarsini	***Carpinterocoris brailovskyi* gen. nov., sp. nov. ***
Bryocorinae	Eccritotarsini	*Crassiembolius nigrus* C., 1981a
Bryocorinae	Eccritotarsini	*Crassiembolius semipallidus* C., 1981a
Bryocorinae	Eccritotarsini	*Cuneomiris elongatus* C., 1981a
Bryocorinae	Eccritotarsini	*Fronsimiris fossatus* C., 1981a
Bryocorinae	Eccritotarsini	*Fronsimiris nigrifrons* C., 1981a
Bryocorinae	Eccritotarsini	*Fronsimiris obtusifrons* C., 1981a
Bryocorinae	Eccritotarsini	***Harpedona gressitti* Stonedahl, 1988b**
Bryocorinae	Eccritotarsini	*Harpedona laensis* Stonedahl, 1988b
Bryocorinae	Eccritotarsini	*Harpedona marginata* Distant, 1904c
Bryocorinae	Eccritotarsini	*Harpedona plana* (Poppius, 1912e)
Bryocorinae	Eccritotarsini	*Harpedona verticicolor* C., 1981a
Bryocorinae	Eccritotarsini	*Harpedona wau* Stonedahl, 1988b
Bryocorinae	Eccritotarsini	*Hemisphaerocoris puncticollis* Poppius, 1912e
Bryocorinae	Eccritotarsini	***Nabirecoris minutus* C., 1981a**
Bryocorinae	Eccritotarsini	*Palaeofurius cyclopensis* C., 1981
Bryocorinae	Eccritotarsini	*Palaeofurius nigroemboliatus* C., 1981
Bryocorinae	Eccritotarsini	*Palaeofurius sagittatus* Poppius, 1912e
Bryocorinae	Eccritotarsini	*Prodromus nigrus* (C., 1981)
Bryocorinae	Eccritotarsini	*Prodromus novoguinensis* Stonedahl, 1988
Bryocorinae	Eccritotarsini	***Prodromus oculatus* (Poppius, 1912e)**
Bryocorinae	Eccritotarsini	*Stenopterocorisca viridis* C., 1981a
Bryocorinae	Eccritotarsini	*Taricoris gressitti* C., 1981a
Bryocorinae	Eccritotarsini	*Taricoris wauensis* C., 1981






Table 3 (continued)

Bryocorinae	Eccritotarsini	*Thaumastomiris discoidalis* Poppius, 1912e
Bryocorinae	Felisacini	*Felisacus dauloi* Woodward, 1958
Bryocorinae	Felisacini	*Felisacus magnificus* Distant, 1904c
Bryocorinae	Felisacini	*Felisacus minutus* C., 1981a
Bryocorinae	Felisacini	*Felisacus nigrescens* C., 1981a
Bryocorinae	Felisacini	*Felisacus nigricornis* Poppius, 1912e
Bryocorinae	Felisacini	*Felisacus ochraceus* Usinger, 1946
Bryocorinae	Monaloniini	*Helopeltis clavifer* (Walker, 1873)
Bryocorinae	Monaloniini	*Mansoniella minuta* C., 1981a
Bryocorinae	Monaloniini	*Pachypeltis annulipes* Poppius, 1912e
Bryocorinae	Monaloniini	*Pachypeltis marginalis* Poppius, 1912e
Bryocorinae	Monaloniini	*Ragwelellus bismarckensis* C. et Wallerstein, 1979
Bryocorinae	Monaloniini	*Ragwelellus festivus* (Miller, 1955)
Bryocorinae	Monaloniini	*Ragwelellus gressitti* C. et Wallerstein, 1979
Bryocorinae	Monaloniini	*Ragwelellus horvathi* (Poppius, 1912e)
Bryocorinae	Monaloniini	*Ragwelellus luteonotatus* C., 1981a
Bryocorinae	Monaloniini	*Ragwelellus magnificus* C., 1981a
Bryocorinae	Monaloniini	*Ragwelellus morobensis* C., 1981a
Bryocorinae	Monaloniini	*Ragwelellus nigrus* C., 1981a
Bryocorinae	Monaloniini	*Ragwelellus similis* C., 1981
Bryocorinae	Monaloniini	*Ragwelellus szentivanyi* C. et Wallerstein, 1979
Bryocorinae	Monaloniini	*Ragwelellus wauensis* C., 1981a
Bryocorinae	Monaloniini	*Pseudodoniella pacifica* China et C., 1951
Bryocorinae	Monaloniini	*Pseudodoniella typica* (China et C., 1951)
Cylapinae	Bothriomirini	*Bothriomiris lugubris* (Poppius, 1915b) **
Cylapinae	Cylapini	*Cylapomorpha pacifica* C., 1956
Cylapinae	Fulviini	*Bironiella binotata* C. et Lorenzato, 1978
Cylapinae	Fulviini	***Bironiella metallescens* Poppius, 1909**
Cylapinae	Fulviini	***Bironiella rubernotata* C. et Lorenzato, 1978**
Cylapinae	Fulviini	*Bironiella trinotata* C. et Lorenzato, 1978
Cylapinae	Fulviini	***Cylapofulvius punctatus* Poppius, 1909**
Cylapinae	Fulviini	*Fulvius bimaculatus* Poppius, 1909
Cylapinae	Fulviini	*Fulvius carvalhoi* Gorczyca, 2000
Cylapinae	Fulviini	***Fulvius constanti* Gorczyca, 2004**
Cylapinae	Fulviini	***Fulvius nigricornis* Poppius, 1909**
Cylapinae	Fulviini	***Fulvius pallidus* Poppius, 1909**
Cylapinae	Fulviini	***Fulvius stysi* Chérot et Gorczyca, 2008**
Cylapinae	Fulviini	***Fulvius subnitens* Poppius, 1909**
Cylapinae	Fulviini	***Fulvius variegatus* Poppius, 1909**
Cylapinae	Fulviini	*Mycetocylapus pacificus* C., 1956
Cylapinae	Fulviini	*Peritropis annulicornis* Poppius, 1909
Cylapinae	Fulviini	***Peritropis graziae* sp. nov. ***
Cylapinae	Fulviini	*Peritropis punctatus* C. et Lorenzato, 1978
Cylapinae	Fulviini	***Peritropis sulawesica* Gorczyca, 2006 ***
Cylapinae	Fulviini	*Peritropisca bituberculata* C. et Lorenzato, 1978
Cylapinae	Fulviini	*Teratofulvioides punctatus* C. et Lorenzato, 1978






Table 3 (continued)

Cylapinae	Fulviini	*Umboiella antennata* C., 1981c
Cylapinae	Vaniini	*Palaucoris biroi* C., 1984c
Cylapinae	Vaniini	*Palaucoris clypeatus* C., 1984c
Cylapinae	Vaniini	***Palaucoris novaguineae* (Ghauri, 1975)**
Cylapinae	Vaniini	***Vanniusoides brevis* (Poppius, 1909)**
Deraeocorinae	Deraeocorini	*Araspus bifasciatus* C., 1984a
Deraeocorinae	Deraeocorini	*Araspus fronsipallidus* C., 1984a
Deraeocorinae	Deraeocorini	***Araspus gressitti* C., 1984a**
Deraeocorinae	Deraeocorini	*Araspus maai* C., 1984 a
Deraeocorinae	Deraeocorini	*Araspus nigrus* C., 1984a
Deraeocorinae	Deraeocorini	*Araspus notomaculatus* C., 1984a
Deraeocorinae	Deraeocorini	*Araspus parcepunctatus* Poppius, 1912b
Deraeocorinae	Deraeocorini	*Araspus partilus* (Walker, 1873b)
Deraeocorinae	Deraeocorini	*Araspus scutellaris* Poppius, 1912b
Deraeocorinae	Deraeocorini	*Araspus trapezinotus* C., 1984a
Deraeocorinae	Deraeocorini	*Araspus wauensis* C., 1984a
Deraeocorinae	Deraeocorini	***Baitatacoris turschi* gen. nov., sp. nov. ***
Deraeocorinae	Deraeocorini	*Deraeocoris biroi* Poppius, 1915a
Deraeocorinae	Deraeocorini	*Deraeocoris cribratoides* C., 1957
Deraeocorinae	Deraeocorini	*Deraeocoris finisterrensis* C., 1985
Deraeocorinae	Deraeocorini	*Deraeocoris gagnei* C., 1985
Deraeocorinae	Deraeocorini	*Deraeocoris gorokensis* C., 1985
Deraeocorinae	Deraeocorini	*Deraeocoris gressitti* C., 1985
Deraeocorinae	Deraeocorini	*Deraeocoris kaitakiensis* C., 1985
Deraeocorinae	Deraeocorini	*Deraeocoris membranalis* C., 1985
Deraeocorinae	Deraeocorini	*Deraeocoris morobensis* C., 1985
Deraeocorinae	Deraeocorini	*Deraeocoris wauensis* C., 1985
Deraeocorinae	Deraeocorini	*Fingulus angusticuneatus* S. et Ca., 1991
Deraeocorinae	Deraeocorini	*Fingulus gressitti* S. et Ca., 1991
Deraeocorinae	Deraeocorini	***Fingulus novobritanicus* S. et Ca., 1991**
Deraeocorinae	Deraeocorini	*Gressitticoris sedlaceki* (C., 1985)
Deraeocorinae	Deraeocorini	*Karimuicoris pronotalis* (C., 1985)
Deraeocorinae	Deraeocorini	*Karubacoris translucidus* C., 1985
Deraeocorinae	Deraeocorini	***Missacoris sigwaltae* gen. nov., sp. nov .***
Deraeocorinae	Deraeocorini	*Morobemiris giluwensis* C., 1985
Deraeocorinae	Deraeocorini	*Papuacoris colocasiae* (Poppius, 1915a)
Deraeocorinae	Deraeocorini	*Papuacoris ottoensis* C., 1985
Deraeocorinae	Deraeocorini	*Papuacoris pallidiceps* (Poppius, 1915a)
Deraeocorinae	Deraeocorini	*Papuacoris papuanus* (Poppius, 1915a)
Deraeocorinae	Deraeocorini	*Papuacoris vittatus* (Reuter, 1908)
Deraeocorinae	Deraeocorini	*Rotundomiris punctatus* C., 1981b
Deraeocorinae	Saturniomirini	*Cheesmaniella clavonigra* C., 1984
Deraeocorinae	Saturniomirini	*Cheesmaniella fasciata* C., 1984
Deraeocorinae	Saturniomirini	*Cheesmaniella nigra* C., 1984
Deraeocorinae	Saturniomirini	*Cheesmaniella notomaculata* C., 1984
Deraeocorinae	Saturniomirini	***Garainamiris antennatus* C., 1981b**






Table 3 (continued)

Deraeocorinae	Saturniomirini	***Imogen bicolor* (Poppius, 1912b)**
Deraeocorinae	Saturniomirini	***Imogen fasciatus* C., 1983**
Deraeocorinae	Saturniomirini	*Imogen formosa* Kirkaldy, 1905
Deraeocorinae	Saturniomirini	***Imogen papuensis* C., 1983**
Deraeocorinae	Saturniomirini	*Saturniomiris lugens* (Walker, 1873b)
Mirinae	Hyalopeplini	***Guisardinus neoguineanus* C. in C. et Gross, 1979**
Mirinae	Hyalopeplini	***Guisardus strigicollis* (Poppius, 1912a)**
Mirinae	Hyalopeplini	***Hyalopeplinus papuensis* C. in C. et Gross, 1979**
Mirinae	Hyalopeplini	***Hyalopeploides cyanescens* Poppius, 1912a**
Mirinae	Hyalopeplini	*Hyalopeploides maculatus* C. in C. et Gross, 1979
Mirinae	Hyalopeplini	*Hyalopeploides neoguineanus* C. in C. et Gross, 1979
Mirinae	Hyalopeplini	*Hyalopeploides ochraeus* C. in C. et Gross, 1979
Mirinae	Hyalopeplini	*Hyalopeploides rubriniscus* C. in C. et Gross, 1979
Mirinae	Hyalopeplini	*Hyalopeploides rubrinoides* C. in C. et Gross, 1979
Mirinae	Hyalopeplini	*Hyalopeploides trinotatus* C. in C. et Gross, 1979
Mirinae	Hyalopeplini	*Hyalopeplus cuneatus* C. in C. et Gross, 1979
Mirinae	Hyalopeplini	*Hyalopeplus kandanensis* C. in C. et Gross, 1979
Mirinae	Hyalopeplini	*Hyalopeplus loriae* Poppius, 1912a
Mirinae	Hyalopeplini	*Hyalopeplus nigrifrons* (Hsiao, 1944)
Mirinae	Hyalopeplini	*Hyalopeplus nigroscutellatus* C. in C. et Gross, 1979
Mirinae	Hyalopeplini	*Hyalopeplus rubroclavatus* C. in C. et Gross, 1979
Mirinae	Hyalopeplini	*Hyalopeplus rubrojugatus* C. in C. et Gross, 1979
Mirinae	Hyalopeplini	***Hyalopeplus similis* Poppius, 1912c**
Mirinae	Mecistoscelini	*Mecistoscelis nigrosignatus* Poppius, 1911d
Mirinae	Mirini	***Adelphocorisella brunnescens* (Poppius, 1915a)**
Mirinae	Mirini	***Argenis incisuratus* (Walker, 1873b) ***
Mirinae	Mirini	*Argenis pericarti* Chérot, 1997
Mirinae	Mirini	***Aristopeplus imperialis* Poppius, 1912a**
Mirinae	Mirini	*Aristopeplus regalis* Poppius, 1912a
Mirinae	Mirini	*Aristopeplus rubronotus* C. et Wallerstein, 1977
Mirinae	Mirini	***Bertsa lankana* (Kirby, 1891) ***
Mirinae	Mirini	*Bispinocoris castaneus* C., 1977
Mirinae	Mirini	*Bispinocoris ottoensis* C., 1988
Mirinae	Mirini	*Creontiades novaeguineae* Poppius, 1915a
Mirinae	Mirini	***Diognetus intonsus* Distant, 1904c ***
Mirinae	Mirini	***Eurystylus costalis* Stål, 1871 ***
Mirinae	Mirini	*Eurystylus reuteri* Poppius, 1911a
Mirinae	Mirini	*Ialibua brandti* C., 1986c
Mirinae	Mirini	*Ialibua gressitti* C., 1986c
Mirinae	Mirini	*Ialibua maai* C., 1986c
Mirinae	Mirini	*Ialibua nigriclava* C., 1986c
Mirinae	Mirini	*Ialibua rubrovenosa* C., 1986c
Mirinae	Mirini	*Ialibua sedlaceki* C., 1986c
Mirinae	Mirini	*Ialibua unicolor* C., 1986c
Mirinae	Mirini	*Ialibua viridicollis* C., 1986c
Mirinae	Mirini	*Kraussmiris nigrus* C., 1986a






Table 3 (continued)

Mirinae	Mirini	*Macrolygus rubrus* (C., 1987)
Mirinae	Mirini	*Macropeplus brunnescens* Poppius, 1912a
Mirinae	Mirini	*Megacoelum papuanum* Poppius, 1915a
Mirinae	Mirini	*Miridius rubrolineatus* (Poppius, 1912c)
Mirinae	Mirini	*Moroca chuavea* C., 1986d
Mirinae	Mirini	*Moroca elongata* C., 1986d
Mirinae	Mirini	*Moroca fasciata* C., 1986d
Mirinae	Mirini	*Moroca giluwensis* C., 1986d
Mirinae	Mirini	*Moroca karubaka* C., 1986d
Mirinae	Mirini	*Moroca lineaticolle* Poppius, 1912[a]
Mirinae	Mirini	*Moroca morobensis* C., 1986d
Mirinae	Mirini	*Moroca nigriclava* C., 1986d
Mirinae	Mirini	*Moroca ottoana* C., 1986d
Mirinae	Mirini	*Moroca rubescens* C., 1986d
Mirinae	Mirini	*Moroca simillima* C., 1986d
Mirinae	Mirini	*Moroca trilineata* C., 1986d
Mirinae	Mirini	*Moroca unicolor* C., 1986d
Mirinae	Mirini	*Moroca verticillata* C., 1986d
Mirinae	Mirini	*Moroca watuta* C., 1986d
Mirinae	Mirini	*Moroca wauensis* C., 1986d
Mirinae	Mirini	*Morocisca pilosa* C., 1986 a
Mirinae	Mirini	*Neopeplus dogoni* Sch. in Ch., 2003
Mirinae	Mirini	*Peltidopeplus annulipes* Poppius, 1912a
Mirinae	Mirini	*Peltidopeplus yasunagai* Chérot et Pauwels, 2000
Mirinae	Mirini	*Proboscidocoris neoguineanus* Poppius, 1915a
Mirinae	Mirini	*Proboscidocoris scutellaris* Poppius, 1915a
Mirinae	Mirini	*Prolygus albocuneatus* C., 1987c
Mirinae	Mirini	*Prolygus alboscutellatus* C., 1987c
Mirinae	Mirini	*Prolygus biscutellatus* C., 1987c
Mirinae	Mirini	***Prolygus ehannoi* sp. nov. ***
Mirinae	Mirini	***Prolygus erimensis* (Poppius, 1914b)**
Mirinae	Mirini	***Prolygus femoralis* (Poppius, 1914b)**
Mirinae	Mirini	*Prolygus finisterrensis* C., 1987c
Mirinae	Mirini	*Prolygus kandanus* C., 1987c
Mirinae	Mirini	*Prolygus kebarensis* C., 1987c
Mirinae	Mirini	*Prolygus loriae* (Poppius, 1914b)
Mirinae	Mirini	*Prolygus maai* C., 1987c
Mirinae	Mirini	*Prolygus nakanaiensis* C., 1987c
Mirinae	Mirini	*Prolygus papuanus* (Poppius, 1914b)
Mirinae	Mirini	***Prolygus polhemusorum* sp. nov. ***
Mirinae	Mirini	*Prolygus punctialbus* C., 1987c
Mirinae	Mirini	*Prolygus quatei* C., 1987c
Mirinae	Mirini	*Prolygus stali* (Poppius, 1914b)
Mirinae	Mirini	*Prolygus watutensis* C., 1987c
Mirinae	Mirini	***Sabactiopus zhengi* sp. nov.***
Mirinae	Mirini	*Stenotus bivittatus* Poppius, 1915a






Table 3 (continued)

Mirinae	Mirini	*Stenotus brevicollis* Poppius, 1915a
Mirinae	Mirini	*Stenotus clypealis* Poppius, 1915a
Mirinae	Mirini	***Tinginotopsis camelus* Poppius, 1915a**
Mirinae	Mirini	*Tinginotopsis moifensis* C., 1987a
Mirinae	Mirini	*Tinginotopsis wauensis* C., 1987a
Mirinae	Mirini	*Tinginotum floraensis* C., 1987a
Mirinae	Mirini	*Tinginotum grandis* C., 1987a
Mirinae	Mirini	***Tinginotum knowlesi* (Kirkaldy, 1908a)**
Mirinae	Mirini	*Tinginotum rubrovenosus* C., 1987a
Mirinae	Mirini	*Tinginotum virescens* Poppius, 1914a
Mirinae	Mirini	*Tolongia gressitti* (C., 1988)
Mirinae	Mirini	***Warrisia huonensis* (Poppius, 1914b)**
Mirinae	Mirini	***Waucoris keyensis* (Poppius, 1915a)**
Mirinae	Mirini	***Waucoris longipes* (Poppius, 1915a)**
Mirinae	Mirini	***Waucoris papuanus* (Poppius, 1915)**
Mirinae	Mirini	*Waucoris poppiusi* Chérot et Malipatil, 2016
Mirinae	Mirini	*Waucoris tricolor* Chérot et Malipatil, 2016
Mirinae	Mirini	***Waucoris wauensis* C., 1987b**
Mirinae	Stenodemini	*Acomocera elongata* (Distant, 1904c)
Mirinae	Stenodemini	*Chaetedus rutilans* Eyles, 1975
Mirinae	Stenodemini	*Lasiomiris albopilosus* (Lethierry, 1888)
Mirinae	Stenodemini	*Lasiomiris neoguineanus* C. et Afonso, 1977
Mirinae	Stenodemini	*Notostiropsis plebejus* Poppius, 1914a
Mirinae	Stenodemini	*Stenodema javanicum* Poppius, 1914a











Taxonomic and faunistic notes on scale insects (Homoptera: Coccinea) of Bali, Flores and New Guinea (Indonesia)

Ilya A. Gavrilov-Zimin

Zoological Institute of the Russian Academy of Sciences, Universitetskaya Emb. 1, 199034, St. Petersburg, Russia; e-mail: coccids@gmail.com

Abstract: Two new species of scale insects (Homoptera: Coccinea) from the mountains of Bali Island, *Pedrococcus glandulitubulatus* sp. nov. and *Tectopulvinaria latidigitata* sp. nov., are described and illustrated. In addition, 18 species new to the local faunas of Bali, Flores and New Guinea are recorded.

Key words: Margarodidae, Ortheziidae, Pseudococcidae, Coccidae, Kerriidae, taxonomy, morphology, Flores, Bali, New Guinea.

Introduction

The vast territory of Indonesia with its more than 17000 large and small islands has been studied rather irregularly and incompletely in respect of scale insects. Most of the material available in the world museums was collected from the Greater Sunda Islands of Sumatra and Java by Dutch and English scientists; the fauna of the two other largest islands, Sulawesi and New Guinea, is only fragmentarily represented in the major scale insect collections, whilst the scale insects of most of the numerous small Indonesian islands have never been studied. In particular, no one scale insect species has been recorded until now from Flores and only 7 species have been recorded previously from Bali (Garcia Morales et al. 2016: ScaleNet database). Taxonomically, only the family Pseudococcidae (the mealybugs) has been comprehensively reviewed for the region in the large monograph by Williams (2004) on the mealybugs of southern Asia. The series of monographs by Williams & Watson (1988a & b; 1990) on the scale insects of the tropical South Pacific Region was based mainly on material collected in Melanesia, Polynesia and the eastern part of New Guinea, but also recorded some new and widely distributed species from the western (Indonesian) part of New Guinea. Recently, I published a paper describing 6 new species and 27 previously unrecorded species from the western, Indonesian part of New Guinea (Gavrilov-Zimin 2013).

The present paper provides the results of my short visits to Bali and Flores in 2011-2012 and also includes notes on several species collected by Professor N.Yu. Kluge in the vicinity of Jayapura (northern New Guinea) in 2012.

Materials and methods

The method of preparation of Canada balsam slide mounts can be found in Danzig & Gavrilov-Zimin (2014), and the higher taxa names used are according to the system in that publication.

The collection numbers with “K” refer to unique collection and preservation numbers for both ethanol material and Canada balsam slides. Most of the material discussed below was collected by the author, collectors of other material are specifically noted under the appropriate species names.

All the material is deposited in the Zoological Institute, Russian Academy of Sciences (ZIN RAS) in St. Petersburg, Russia.

Taxonomic part

Margarodidae s. l.

Drosicha townsendi Cockerell, 1905

Material: K 981, Flores, Labuan Bajo, beach by the sea, on stem of dicotyledonous herb, 16.XII.2012, coll.





D.A. Gapon.

Comments: The genus *Drosicha* Walker, 1858 contains 24 nominal species and is in great need of revision. Many of these "species" were described by early authors without complete figures, discussion of important taxonomic characters or comparison with other species; some of the other "species" are known only as males and therefore cannot be compared with species described based on adult females. One of the "oldest" species, described from the Oriental region (Philippines), is *Drosicha townsendi* and I did not find any differences between the redescription of this species by Morrison (1920) and characters of the female collected from Flores.

Icerya samaraia (Morrison, 1927)
Steatococcus samaraius Morrison, 1927
Material: K 966, Bali, peninsula Bukit near Padang beach, on leaves of tree, 13.XII.2012.
Comments: The species is widely distributed in tropical and subtropical regions of the world, including different islands of Indonesia; however, this is the first record from Bali.

Ortheziidae

Insignorthezia insignis (Browne, 1887)
Material: K 951, Bali, mountain forest above Lake Buyan, about 1700 m altitude, on stem and leaves of bush, 15.XI.2011.

Comments: This widely distributed, pantropical species has not been recorded previously from Bali or Indonesia as a whole.

Pseudococcidae

***Pedrococcus glandulitubulatus* sp. nov.** (Fig. 1)
Holotype ♀: K 938, Bali, mountain forest above Lake Buyan, about 1,200 m altitude, on leaf of tree, 13.XI.2011, coll. Ilya Gavrilov-Zimin.

Derivatio nominis: The species name is constructed from two Latin words "glandula" and "tubula".
Description: Adult female. Body elongate oval, about 2 mm long. Antenna 8-segmented. Legs normally developed; hind coxa with translucent pores; claw without a denticle; tarsal digitules knobbed. Anal apparatus complete, with inner row of pores, outer row of spinulae and 6 setae, length of each seta about twice diameter of anal ring. Both pairs of ostioles well developed, each with trilocular pores and short flagellate setae on lips. Circulus absent. Multilocular pores few, present around vulva and forming transverse row in medial zone of abdominal sternite VI. Quinquelocular pores absent. Trilocular pores evenly scattered over body surface; additionally, minute trilocular pores present in cerarii around collars of conical setae. Tubular ducts of simple type, very few, occasionally present on several posterior abdominal sternites; each duct about same length as diameter of a multilocular pore. Cerarii numbering 17 pairs, each cerarius with 2 large conical setae, except C_1 with 4 setae and C_2 with 1 seta, plus several minute trilocular pores and several normal trilocular pores, all on a sclerotized tubercle. Large conical setae similar to cerarian setae present (larger setae on a sclerotized area of derm, smaller setae on membranous cuticle), forming transverse rows across all segments of dorsum (Fig. 1); other dorsal setae rather variable. Flagellate setae of various sizes numerous on both body surfaces.
Collected female, pre-oviposition, was without any wax secretions.
Males and morphology of larvae are unknown.
Comments: The genus *Pedrococcus* Mamet, 1942 was erected for four Afrotropical species; later four additional species were described from Mauritius (*P. simplex* Mamet, 1943), Madagascar (*P. madagascariensis* Mamet, 1954), Solomon Islands (*P. tinahulanus* Williams, 1960) and Malaysian Borneo (*P. poruli* Williams, 2004). Williams (2004) provided a new generic concept of *Pedrococcus*, distinguishing it from the nearest genus, *Pedronia* Green, 1922, by the presence of minute trilocular pores in the cerarii. According to this (and some others) character, *P. simplex* and *P. tinahulanus* should be excluded from the genus (Williams 2004). All the four remaining species (three Afrotropical and one Oriental) totally lack tubular ducts. In contrast to them, *Pedrococcus glandulitubulatus* sp. nov. has tubular ducts on the posterior abdominal sternites; also, it differs from the Oriental *P. poruli* in having 17 pairs cerarii (*P. poruli* has one pair) and shorter flagellate setae on dorsum.

Chaetococcus bambusae (Maskell, 1893)
Material: K 978, Flores, Labuan Bajo, under the leaf sheaths of bamboo, 15.XII.2012.

Comments: The species is widely distributed in tropical and subtropical regions of the world, including the larger islands of Indonesia; this is the first record from Flores.





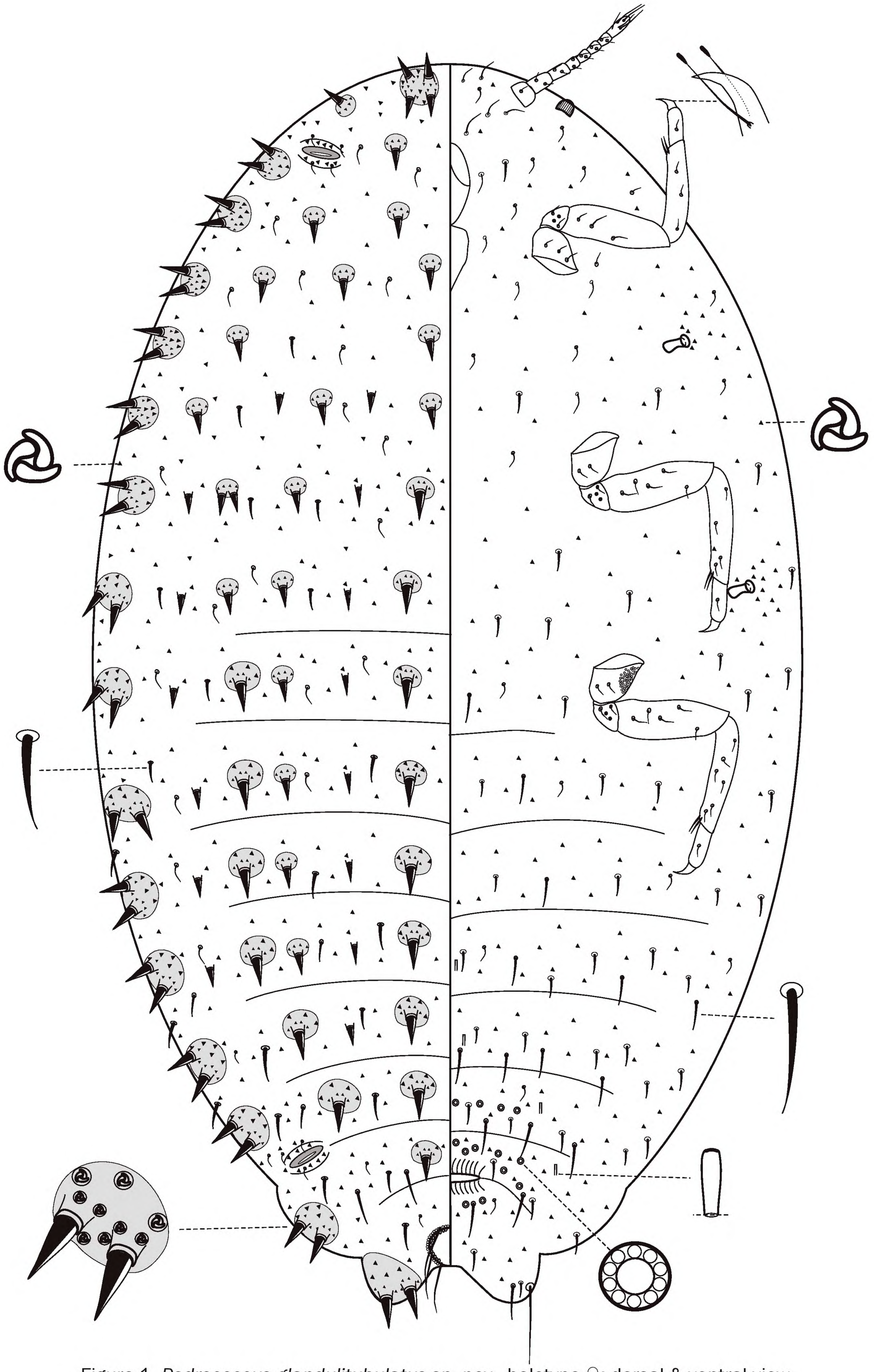



Figure 1. *Pedrococcus glandulitubulatus* sp. nov., holotype ♀: dorsal & ventral view.



Crisicoccus cambodiensis (Takahashi, 1942)
Material: K 945, Bali, mountain forest above Lake Buyan, about 1700 m altitude, on leaf of bush, 14.XI.2011.

Comments: This species was previously only known from its type locality, Cambodia: Angkor. The present specimens, collected in Bali, differ from the syntypes (redescribed and illustrated by Williams 2004: 131) in having significantly fewer tubular ducts on the thorax and all the tubular ducts clearly have a double collar, in contrast to the simple tubular ducts figured by Williams (l.c.); however, the latter character could simply been not discernible during the study of old slides prepared by R. Takahashi.

Crisicoccus kimanisicus Williams, 2004
Material: K 1299, Indonesian part of New Guinea, vicinity of Jayapura, Sentani, without information on host plant, coll. N.Yu. Kluge.

Comments: The species has been noted previously only from Malaysian Borneo (Sabah) (Williams 2004). This is the first record from western New Guinea and from Indonesia as a whole.

Dysmicoccus neobrevipes Beardsley, 1959
Material: K 971, 974, Flores, Labuan Bajo, on inflorescence of undetermined tree and on stem of dicotyledonous herb, 14 and 15.XII.2012.

Comments: The species is widely distributed in tropical and subtropical regions of the world, but this is the first record from Flores and from Indonesia as a whole.

Maconellicoccus hirsutus (Green, 1908)
Material: K 989, Flores, Labuan Bajo, on ornamental *Hibiscus* sp., 16.XII.2012.

Comments: The species is widely distributed in tropical and subtropical regions of the world, including various islands of Indonesia (Williams 2004); this is the first record from Flores.

Palmicultor lumpurensis (Takahashi, 1951)
Material: K 940, 952, Bali, terrace of agricultural slopes above Lake Buyan, about 1200 m altitude, under the leaf sheaths of bamboo, 14 and 15.XI.2011.

Comments: The species is widely distributed in the Oriental region and recently was recorded by Gavrilov-Zimin (2013) for the first time from Indonesia (western New Guinea, vicinity of Manokwari). This is the first record from Bali.

Phenacoccus solenopsis Tinsley, 1898
Material: K 964, 965, Bali, Bukit peninsula near Padang beach, on leaves of Fabaceae tree and on dicotyledonous herb, 12.XII.2012; K 983, 986, 988, Flores, Labuan Bajo, on leaves and stems of various ornamental bushes, especially numerous on *Hibiscus* spp., 16.XII.2012.

Comments: The species is widely distributed in tropical and subtropical regions of the world. For Indonesia, it was recently recorded by Gavrilov-Zimin (2013) from western New Guinea, vicinity of Manokwari. These are the first records from Bali and Flores.

Planococcus lilacinus (Cockerell, 1905)
Material: K 972, 975, 977, Flores, Labuan Bajo, on leaves and fruits of different trees, 14 and 15.XII.2012.

Comments: The species is widely distributed in tropical and subtropical regions of the world, including different islands of Indonesia; this is the first record from Flores.

Pseudococcus jackbeardsleyi Gimpel et Miller, 1996
Material: K 982, Flores, Labuan Bajo, beach by the sea, on leaf of dicotyledonous herb, 16.XII.2012.

Comments: The species is widely distributed in tropical and subtropical regions of the world. In Indonesia, it has been recorded from Java (Williams 2004) and from western New Guinea, vicinity of Manokwari (Gavrilov-Zimin 2013); this is the first record from Flores.

Pseudococcus cf. ***philippinicus*** Williams, 2004
Material: K 937, 949, Bali, mountain forest above Lake Buyan, about 1,200 m altitude, on leaves of various trees, 13 and 15.XI.2011; K 1299, Indonesian part of New Guinea, vicinity of Jayapura, Sentani, without information on host plant, 22.VIII.2012, N.Yu. Kluge.

Comments: The species has been noted previously in the Philippines and China (Beijing); this is the first record from Bali, the western part of New Guinea and from Indonesia as a whole. The specimens collected in Bali and New Guinea differ from the type specimens described and illustrated by Williams (2004) in the number of dorsal fungiform ducts (= “oral rim tubular” ducts): these are more numerous in the females from Bali than in the type specimens and are almost totally






lacking in the females from New Guinea. However, both series demonstrate a unique character of *P. philippinicus* – a saccate vulva with four internal sclerotized pouches, i.e., as in the type specimens of this species; so these samples are here believed to represent *P. philippinicus* and the differences in the number of dorsal ducts are considered to be due to geographical intraspecific variation.

Coccidae

***Tectopulvinaria latidigitata* sp. nov.** (Fig. 2)
Holotype ♀: K 946, Bali, mountain forest above Lake Buyan, about 1700 m altitude, on twig of tree, 14.XI.2011, Ilya Gavrilov-Zimin.

Derivatio nominis: The species name was constructed from two Latin words "latus" and "digitalis".
Description: Adult female. Body broadly oval, about 2 mm long. Antenna 8- segmented. Legs well developed, each with a tibio-tarsal articulation; claw without a denticle; claw digitules enlarged, with large basal and apical knobs (Fig. 2). Anal apparatus with 6 setae. Multilocular pores present on posterior 4 abdominal segments only. Quinquelocular pores forming a band 2 or 3 pores wide in each spiracular furrow. Preopercular pores forming a sparse band from anal plates to mesothorax. Simple pores scattered on both body surfaces. Dorsal duct tubercles absent. Tubular ducts of three main types: ducts with broad inner ductules scattered medially on thoracic and anterior abdominal segments; ducts (small and large) with thin ductules forming a broad submarginal band on ventral surface of body. Marginal setae long, flagellate, each about same length as tarsus, forming double row along entire body margin. Stigmatic setae absent, but shallow stigmatic clefts present. Dorsum with sparse, short conical setae. Ventral surface of body with sparse flagellate setae of different sizes, the largest scattered in medial zone of venter.
Collected female, pre-oviposition, was without any wax covering.
Males and morphology of larvae are unknown.
Comments: The type species of the genus *Tectopulvinaria* Hempel, 1900, *T. albata* Hempel, 1900 was redescribed in detail by Hodgson (1994). Amongst the important diagnostic characters of this species is the absence of stigmatic setae, which are usually well developed in other genera of soft scale insects (Coccidae) and differ significantly in form and size from the other marginal setae. Two other species formally placed by subsequent authors in *Tectopulvinaria* (*T. farinosa* (Green, 1922) from Sri Lanka and *T. loranthi* Froggatt, 1915 from Australia), have well-developed and distinct stigmatic setae and also differ from the type species in some other important details; both of these species are probably unrelated to *T. albata*, as was noted previously by other scientists (see discussion in Hodgson 1994: 574). On the other hand, the specimens collected in Bali seem to be very similar morphologically to the type species of *Tectopulvinaria* although they differ from it by lacking dorsal bilocular pores, and by having ventral tubular ducts on the head and enlarged claw digitules.

Coccus viridis (Green, 1889)
Material: K 939, Bali, mountain forest above Lake Buyan, about 1200 m altitude, on leaves of tree, 13.XI.2011.

Comments: The species is widely distributed in tropical and subtropical regions of the world, including the larger islands of Indonesia; this is the first record from Bali.

Luzulaspis australis (Maskell, 1894)
Material: K 992, Flores, vicinity of Labuan Bajo, Wae Cicu, on leaves of grass (Poaceae), 17.XII.2012.

Comments: This species was known only from Australia until recently. However, it was collected in 2013 in the northern part of New Guinea in vicinity of Jayapura by Gavrilov-Zimin (2013); this is the first record from Flores.

Milviscutulus mangiferae (Green, 1889)
Material: K 968, Bali, Bukit peninsula near Padang beach, on leaf of tree, 13.XII.2012.

Comments: The species is widely distributed in tropical and subtropical regions of the world, including the larger islands of Indonesia; this is the first record from Bali.

Pulvinaria psidii Maskell, 1893
Material: K 987, Flores, vicinity of Labuan Bajo, on leaves of *Morinda citrifolia*, 16.XII.2012.

Comments: The species is widely distributed in tropical and subtropical regions of the world, including the larger islands of Indonesia; this is the first record from Flores.





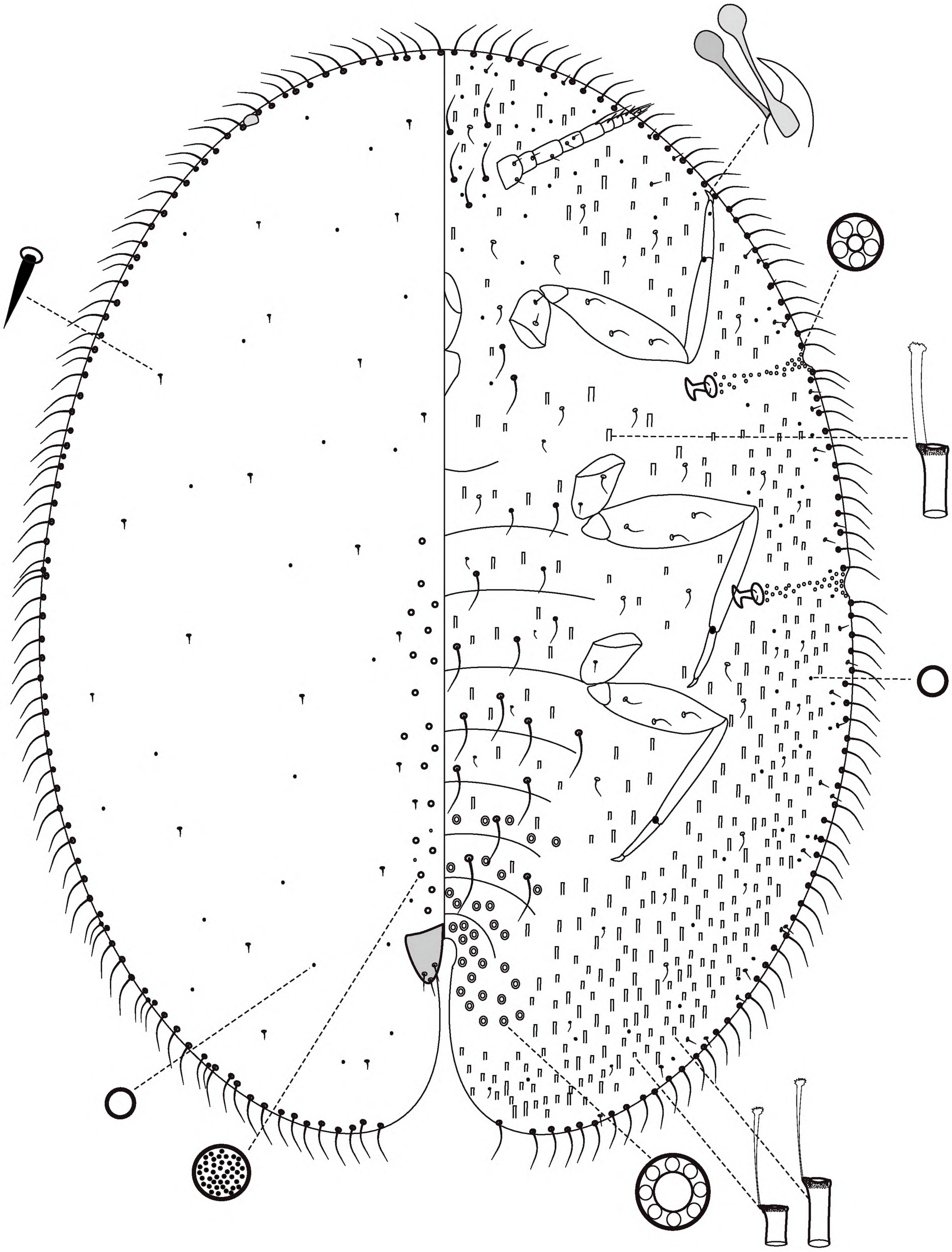



Figure 2. *Tectopulvinaria latidigitata* sp. nov., holotype ♀: dorsal & ventral view.





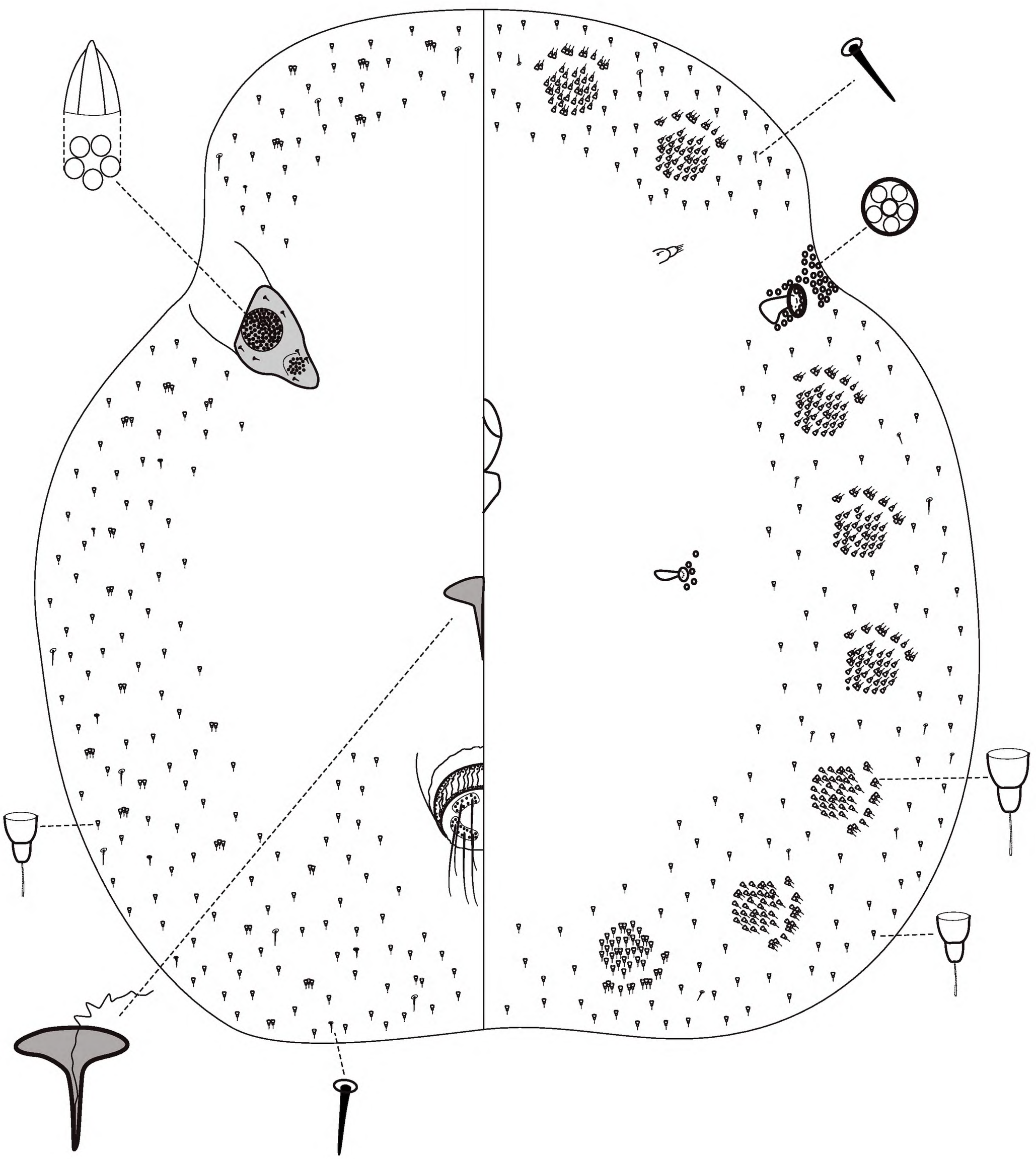



Figure 3. *Tachardina aurantiaca* (Cockerell, 1903), ♀ from Flores Island: dorsal & ventral view.



Kerriidae

Tachardina aurantiaca (Cockerell, 1903) (Fig. 3)
Material: K 980, Flores, vicinity of Labuan Bajo, on leaves of *Morinda citrifolia*, 15.XII.2012; K 1300, Indonesian part of New Guinea, vicinity of Jayapura, without information on host plant, VIII.2012, N.Yu. Kluge.

Comments: The species has been previously noted from the Maldives, Thailand, Malaysia, Singapore, Indonesia (Java) and Christmas Island (according to Garcia Morales et al. 2016: the ScaleNet database); these are the first records from Flores and the Indonesian part of New Guinea. In view of the absence of an adequate illustration of this species in the coccidological literature, I have included one (Fig. 3), based on the females collected on Flores.

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Taxonomic review of Diplommatinidae (Caenogastropoda: Cyclophoroidea) from Wallacea and the Papuan Region

Kristine Greķe

Dārza iela 10, LV-2130, Dzidriņas, Stopiņu novads, Latvia; e-mail: k.greke@gmail.com

Abstract: Diplommatinidae L. Pfeiffer, 1856 from the Papuan Region and Wallacea excluding the island of Sulawesi are revised taxonomically. A total of 121 species in 5 genera are recognized within the study area. Type material of all previously described species from New Guinea, Wallacea and Solomon Islands was examined. Fifteen lectotypes are designated and four species are synonymized. The genus *Anostomella* Martens, 1867 is synonymized with *Palaina* O. Semper, 1865 based on DNA sequence data and shell conchological characters. Six new combinations are proposed based on both conchological characters and DNA sequence data. 54 new species are described, illustrated and keyed. The distribution of each species is mapped allowing biogeographic analyses. Chirality of Papuan and Wallacean Diplommatinidae is discussed. The conservation status of each species is preliminary assessed with regard to IUCN guidelines.

Key words: Gastropoda, Diplommatinidae, Papuan Region, Wallacea, Lesser Sunda Islands, Solomon Islands Moluccas, New Guinea, taxonomy, biogeography, nomenclatural changes, endemism, conservation, identification, chirality, phylogeny.

Introduction

The Diplommatinidae L. Pfeiffer, 1856 are minute (1-10 mm) terrestrial caenogastropod snails distributed in subtropical and tropical Asia from eastern Russia and Japan in the north to Sri Lanka and the Sunda Islands in the south, as well as northeastern Australia, the Papuan Region, and Pacific islands, with a single genus *Adelopoma* Doring, 1884 in Central and South America (Egorov 2013). Earlier authors established numerous genera based only on conchological characters. The variation within genera and subgenera established by earlier authors is very high and characters used for distinction of (sub)genera are often of low taxonomic value (e.g. variable characters of shell ribbing pattern, shell shape etc.). Taking into account the diversity of shell forms in diplommatinids, many of these (sub)generic taxa are considered dubious (e.g. Vermeulen 1993, 1996a). The Diplommatinidae are widely known for high endemism and small geographically narrow ranges, which are often restricted to small limestone areas (e.g. Clements et al. 2006; Liew et al. 2014; Vermeulen 1996a).

The Papuan Region is a vast equatorial insular system of complex geological history situated between the Asian, Australian and Pacific plates. It is a region with diverse and highly endemic fauna. Despite recent significant progress in diplommatinid research in SE Asia and the Pacific (e.g. Vermeulen 1991, 1993, 1996a; Neubert & Bouchet 2015; Yamazaki et al. 2015a, 2015b), almost no new information has been published on species in the Papuan Region since the last review of the West Papuan terrestrial operculates by van Benthem Jutting (1963) which was based on limited material available at that time. Even less attention was paid to the diplommatinids of Lesser Sunda Islands (= Nusa Tenggara), the Moluccan and the Solomon Islands.

Recent collecting by various scientific institutions in New Guinea, the Solomon Islands, the Moluccas and Lesser Sunda Islands provides material for the first comprehensive revision of the Diplommatinidae from the Papuan Region (Sulawesi is excluded from present study since no new material was available from this island). 71 Diplommatinidae species (some are synonymized in the present work) from the genera *Arinia* H. et A. Adams, 1856, *Diancta* s. str. Martens, 1864, *Diplommatina* s. l. Benson, 1849, *Moussonia* s. str. O. Semper, 1865, *Palaina* s. l. O. Semper, 1865, and *Pseudopalaina* von Möllendorff, 1897 were previously reported from the study area. Another 54 species are de-





scribed, illustrated and keyed in the present work. This study proposes six new combinations. Five new synonyms are proposed. The genus *Anostomella* Martens, 1867 is synonymized with *Palaina* O. Semper, 1865. The species *Palaina delli* Clench, 1965 is synonymized with *P.* (s. l.) *gardneri* Dell, 1955; *P. megamorpha* Solem, 1960 is synonymized with *Palaina* (s. l.) *aerari* (Dell, 1955); *P. vexator* I. et B. Rensch, 1929 is synonymized with *P.* (s. l.) *novopommerana* I. et B. Rensch, 1929; the subspecies *P. commixta jacquinoti* I. Rensch, 1937 is synonymized with *P.* (s. l.) *commixta* I. Rensch, 1937. Lectotypes are designated for the following 15 species: *Arinia* (s. l.) *blanda* E.A. Smith, 1897, *A.* (s. l.) *talautana* Fulton, 1898, *Diancta* (s. str.) *constricta* (Martens, 1864), *D.* (s. str.) *torta* O. Boettger, 1891, *Diplommatina* (s. l.) *floresiana* E.A. Smith, 1897, *D.* (s. l.) *smithi* Kobelt et von Möllendorff, 1898, *D.* (s. l.) *symmetrica* Hedley, 1891, *Moussonia ahena* (Preston, 1913), *Palaina* (s. l.) *ascendens* (Martens, 1864), *P.* (s. str.) *diepenheimi* (Preston, 1913), *P.* (s. l.) *dohertyi* E.A. Smith, 1897, *P.* (s. l.) *granulum* I. et B. Rensch, 1929, *P.* (s. l.) *novoguineensis* E.A. Smith, 1897, and *P.* (s. l.) *schneideri* I. et B. Rensch, 1929. The following 54 new taxa are described and illustrated: *Diancta* (s. str.) *halmaherica* sp. nov. (Halmahera Is.), *D.* (s. str.) *obiensis* sp. nov. (Obi Islands), *Diplommatina* (s. l.) *jonabletti* sp. nov. (Flores Is.), *D.* (s. l.) *maibrat* sp. nov. (W New Guinea), *D.* (s. l.) *moluccensis* sp. nov. (Ternate & Tidore islands), *D.* (s. l.) *patani* sp. nov. (Halmahera Is.), *D.* (s. l.) *slapcinskyi* sp. nov. (Obi Islands), *D.* (s. l.) *telnovi* sp. nov. (W New Guinea & Misool Is.), *D.* (s. l.) *timorensis* sp. nov. (Timor Is.), *D.* (s. l.) *waigeoensis* sp. nov. (Waigeo Is.), *Moussonia echinata* sp. nov. (W New Guinea), *M. manuselae* sp. nov. (Seram Is.), *M. monstrificabilis* sp. nov. (Misool Is.), *M. pseudoseparanda* sp. nov. (W New Guinea), *M. separanda* sp. nov. (Misool Is.), *M. torricelli* sp. nov. (N New Guinea), *Palaina* (s. l.) *albrechti* sp. nov. (N New Guinea), *P.* (s. l.) *attenboroughi* sp. nov. (Misool Is.), *P.* (s. l.) *bougainvillei* sp. nov. (Bougainville Is. group), *P.* (s. l.) *dianctoides* sp. nov. (W New Guinea), *P.* (s. l.) *doberai* sp. nov. (W New Guinea), *P.* (s. l.) *extremita* sp. nov. (E New Guinea), *P.* (s. l.) *flavocylindrica* sp. nov. (W New Guinea), *P.* (s. l.) *hartmanni* sp. nov. (Waigeo Is.), *P.* (s. l.) *iha* sp. nov. (W New Guinea), *P.* (s. l.) *imperfecta* sp. nov. (Waigeo Is.), *P.* (s. l.) *insulana* sp. nov. (Polee Is. near Misool), *P.* (s. l.) *laszloi* sp. nov. (Wayag Is. near Waigeo Is.), *P.* (s. l.) *lengguru* sp. nov. (W New Guinea), *P.* (s. l.) *louisiade* sp. nov. (Louisiade Islands), *P.* (s. l.) *mairasi* sp. nov. (W New Guinea), *P.* (s. l.) *megalostoma* sp. nov. (Waigeo Is.), *P.* (s. l.) *mengen* sp. nov. (New Britain Is.), *P.* (s. l.) *minuscularia* sp. nov. (Misool Is.), *P.* (s. l.) *minutula* sp. nov. (Halmahera Is.), *P.* (s. l.) *mirifica* sp. nov. (Yamdena Is.), *P.* (s. l.) *misoolensis* sp. nov. (Misool Is.), *P.* (s. l.) *mutis* sp. nov. (Timor Is.), *P.* (s. l.) *obiensis* sp. nov. (Obi Islands), *P.* (s. l.) *onin* sp. nov. (W New Guinea), *P.* (s. l.) *papuamontis* sp. nov. (Central New Guinea), *P.* (s. l.) *paradisaea* sp. nov. (Waigeo Is.), *P.* (s. l.) *perspectiva* sp. nov. (W New Guinea), *P.* (s. l.) *psittricha* sp. nov. (Misool Is.), *P.* (s. l.) *silvicultrix* sp. nov. (Waigeo Is.), *P.* (s. l.) *slapcinskyi* sp. nov. (N New Guinea), *P.* (s. l.) *sparselamellata* sp. nov. (Waigeo Is.), *P.* (s. l.) *tanimbarensis* sp. nov. (Yamdena Is.), *P.* (s. l.) *telnovi* sp. nov. (Waigeo Is.), *P.* (s. l.) *thomasrinteleni* sp. nov. (Yamdena Is.), *P.* (s. l.) *vermeuleni* sp. nov. (Aru Islands), *P.* (s. l.) *waigeo* sp. nov. (Waigeo & Wayag islands), *P.* (s. l.) *wawiyai* sp. nov. (Waigeo Is.), and *P.* (s. l.) *yamdena* sp. nov. (Yamdena Is.). An identification key to the Diplommatinidae of the Papuan Region and Wallacea is compiled for the first time. Taxonomic decisions based on morphological data are corroborated by new DNA sequence data studied for certain taxa. Biogeographically, all genera are shared with neighbour regions of insular Asia and Australia. Only 2 species are shared with adjacent regions. Therefore, >98% of diplommatinid species from Wallacea and the Papuan Region considered regional and local endemics with very restricted distribution.

Papuan and Wallacean Diplommatinidae are usually associated with limestone areas and are especially diverse in regions with limestone soils (for example, Raja Ampat islands of Misool and Waigeo, Cenderawasih Bay Island of Biak etc.). Most Papuan diplommatinids are reported from primary or old growth secondary rainforests but several species are also recorded from secondary rainforest areas and even from gardens and plantations suggesting some species are ecologically plastic. Conservation status was assessed using IUCN methodology (for details see chapter “Materials and Methods”) for all species. Most species are classified as Data Deficient and Least Concern.

Considering the large study area, about 1% of the Earths total land area, a complex geological history, numerous islands, rich fauna, dramatic and inaccessible terrain and high cost of biological studies in this part of the world, this revision to be considered preliminary investment into the knowledge of the Papuan and Wallacean diplommatinids. No malacological studies performed at all or no diplommatinid material is available from many islands (e.g. Kei Islands, Manus Island, New Ireland, Sula Islands etc.) or parts of larger islands






(e.g. Central Cordillera of Indonesian New Guinea, Adelbert Range, lowlands of Bomberai Peninsula etc.). Our knowledge of the fauna of other islands (e.g. Bougainville, Seram, Timor, and New Guinea) is still fragmentary. The 121 species now known from the Papuan Region and Wallacea (Sulawesi excluded) probably represent only a fraction of the total diplommatinid diversity for the area, especially when compared to the 42 species reported from Fiji (Neubert & Bouchet 2015) and the nearly 170 diplommatinid taxa found on Borneo (Liew 2016).

Materials and methods

The present review is the first attempt to summarize existing knowledge of the Diplommatinidae of Wallacea and Papuan Region, and presents new information based on additional material available from recent surveys and museum collections.

The material

Diplommatinids were collected from leaf litter using standard techniques including Winkler and other sieves or by hand from the underside of stones and fallen leaves, or inside or under rotten wood. Rocky formations, especially those composed of limestone were inspected visually for rupicole species. Totally over 500 specimens were studied. Among them about 30% are previously identified museum material including type material and about 70% are recently collected specimens. This review reflects the current knowledge of diplommatinid snails within the study area and is limited, because available material is sparse and much of the Papuan and Wallacean region remains to be sampled. The diversity of Diplommatinidae in Wallacea and Papuan Region is predicted to be much higher than the results of this first study.

Most specimens described below (with the exception of historical ones) are preserved in 99% ethanol. Specimens were studied using a Leica S6D stereomicroscope. The internal lamellar system was exposed using pins (size 1 or 3 depending on the dimensions of the shell). Specimens were photographed using a Canon EOS 450D DSLR camera attached to a stereomicroscope. Multiple photographs were taken at different focal planes and reassembled using CombineZP software. Scanning electron microscope (SEM) photographs were taken using SEM provided by the Latvian University's Faculty of Biology. Shells were ultrasonically cleaned in distilled water for 5 min, washed through a graded alcohol series up to 99%, air dried and placed dorsally onto conductive tape on aluminium stubs. Shells were imaged using a Hitachi TM-3000 (Hitachi High Technologies ®) SEM following methods described by Geiger et al. (2007).

Holotypes of the newly described species are deposited in the collections of Natural History Museum in London (United Kingdom), Natural History Museum in Erfurt (Germany), Naturalis Biodiversity Center in Leiden (The Netherlands), Florida Museum of Natural History in Gainesville (U.S.A.), and Lee Kong Chian Natural History Museum in Singapore.

All genera and species are listed alphabetically, because a phylogenetic arrangement is currently impossible. All label text is reproduced without corrections or additions; labels (if more than one for the same specimen) are separated by slashes (/). All labels are printed unless stated otherwise. Author's comments are placed in square brackets [ ]. All type specimens of new species described in the present publication are provided with an additional black-framed printed label 'Holotypus' or 'Paratypus' on red paper. Consequently, lecto- and paralectotype specimens designated below are provided with additional labels 'Lectotypus' or 'Paralectotypus'.

Acronyms for scientific collections used in the text:

BMNH – British Museum (Natural History), London, United Kingdom;
FMNH –The Field Museum of Natural History, Chicago, U.S.A.;
KGC – Collection Kristine Greķe, Dzidriņas, Latvia;
LKCNHM – Lee Kong Chian Natural History Museum, National University of Singapore, Singapore;
MCZ – Museum of Comparative Zoology, Harvard University, Cambridge, U.S.A.;
MHUB – Museum für Naturkunde der Humboldt-Universität zu Berlin, Germany;
MMUE – The University of Manchester Museum, Manchester, United Kingdom;
MONZ – Museum of New Zealand, Wellington, New Zealand;
MSNG – Museo Civico di Storia naturale „Giacomo Doria", Genova, Italy;
NHMB – Naturhistorisches Museum Basel, Switzerland;
NME – Naturkundemuseum Erfurt, Germany;
NMNL – National Museum of Natural History "Naturalis", Leiden, The Netherlands;
SMF – Senckenberg Forschungsinstitut und Naturmuseum, Frankfurt am Main, Germany;
SNSD – Senckenberg Naturhistorische Sammlungen, Dresden, Germany;
UF – Florida Museum of Natural History, University of






Florida, Gainesville, U.S.A.;
UMMZ – Museum of Zoology, University of Michigan, Ann Arbor, U.S.A.;
UWCP – Museum of Zoology, University of Wrocław, Poland.
ZSM – Zoologische Staatssammlung München, Germany.

Phylogenetic assessment

For phylogenetic reconstruction, the following methodology was used: Gene fragment: mitochondrial cytochrome c oxidase subunit I (COI), primer combinations (forward / reverse) used for the amplification = LCO1490 / COR722b (Folmer et al. 1994; Wilke & Davis 2000, respectively) and L1490-Alb / H2198-Alb (Gittenberger et al. 2004). Number of taxa = 94 (12 newly sequenced Diplommatinidae taxa from Wallacea and New Guinea plus 78 taxa downloaded from GenBank: 36 from Rundell 2008, 42 from Webster et al. 2012, and 4 outgroup taxa).

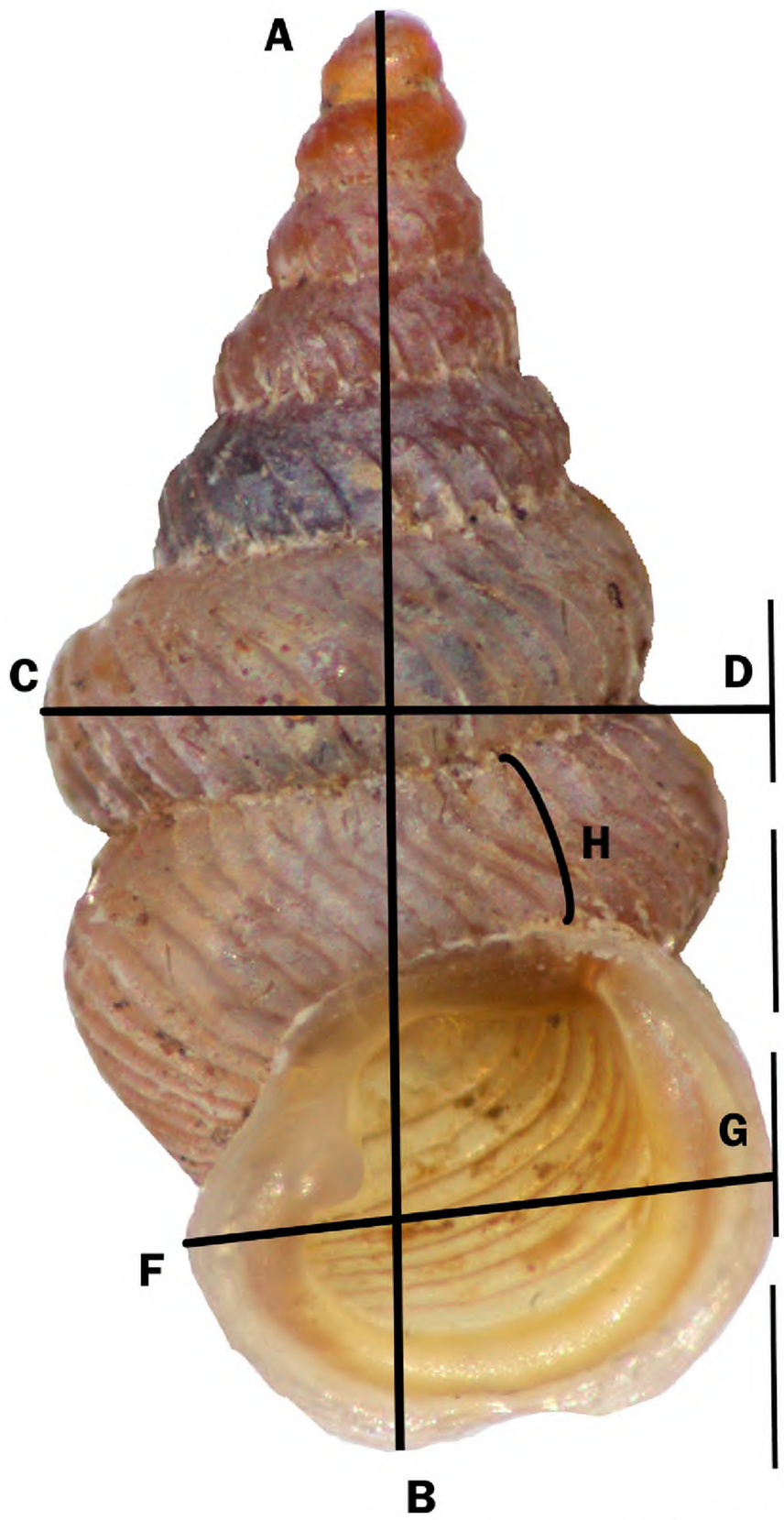


Figure 1. Terminology for measurements. A-B – shell height (H); A1-B1 – height of last whorl (HW); C-D – shell width (D); F-G – maximum width of peristome (PD); H – beginning of the ultimate whorl.

Used outgroup based on the phylogeny of Webster et al. (2012) = *Aperostoma palmeri* (DQ093523), *Conus miles* Linnaeus, 1758 (AY588202), *Conus miliaris* Hwass in Bruguière, 1792 (FJ411486), and *Pomacea insularum* (D'Orbigny, 1839) (FJ946828). Fragment length = 658 base pairs (bp). Used model of sequence evolution = GTR + I + Γ (selected by the software jModelTest version 2.1.4 based on the Akaike Information Criterion). Phylogenetic relationships were reconstructed using Bayesian inference implemented in the software package MrBayes version 3.2.2: used parameter: nchains = 4, ngen = 5 000 000, samplefreq = 100, temp = 0.1, burnin = 25% (N = 12 500). For DNA extraction and PCR reaction, same conditions were followed as a previous study (Webster et al. 2012).

Conservation status assessments and endemism

Conservation status is assessed for each species using IUCN Red list criteria and guidelines (IUCN 2016). Conservation status is assessed using data from fieldwork in the Papuan Region in 2007-2016 as well as published information and museums specimens. When applicable, GeoCat tool (Bachman et al. 2011) was used to calculate extent of occurrence and area of occupancy. These IUCN assessments to be considered preliminary since they were not controlled and approved by IUCN staff.

Categories of endemism used in the text (see chapter "Annotated list of the Diplommatinidae from the Papuan Region and Wallacea" below) are based on Hamer & Slotow (2002).

Terminology used in this review

Consider Map 1 for study area boundary definition. Lesser Sunda Islands, or Nusa Tenggara is the geographic term for a group of mainly Indonesian islands of the Sunda volcanic arc that are situated to the east of Java Island. The main islands and their groups (west to east) are: Bali, Lombok, Sumbawa, Flores, Sumba, Timor, Alor Archipelago, Tanimbar Islands. All of these islands except Bali are considered part of Wallacea.

Wallacea – zoogeographic term used in the broad sense for a group of mainly Indonesian islands located in between Wallace's Line in the West and Lydekker's Line in the East, e.g. Lesser Sunda Islands (Map 1), the Moluccas and Sulawesi. Eastern part of Wallacea (The Moluccas incl. Kei and Tanimbar Islands) is a part of the Papuan Region. Sulawesi is not included into my study area.

Papuan Region – zoogeographic term in the sense of Gressitt (1982), Beehler et al. (1986), Riedel (2002), and Telnov (2011). This area is defined as the Sahul continental shelf islands, including those north and east of New Guinea and Torres Strait islands south of it. In the west, chains of Moluccan Islands (North, Central and South Moluccas) with a high percentage of Papuan faunal elements, are also considered part of the Papuan Region with Weber's Line used as the western boundary of the region. In parallel, these islands are also a part of Wallacea (Map 1).

For all species, the following measurements were taken: shell height (Fig. 1. A-B) in most species supplemented with height of the last whorl (Fig. 1 A1-B1), shell width (Fig. 1 C-D), maximum width of the peristome inclusive of its maximum expansions (Fig. 1 F-G). Species were split into four informative groups by their shell size:

very small – average shell height does not exceed 2 mm;
small – average shell height is between 2-3 mm;
large – average shell height is between 3-5 mm;
very large – average shell height exceeds 5 mm.

Density of axial ribs was measured on penultimate whorl on the apertural side of the shell.

The internal lamellae of diplommatinid shells are usually rich in characters and can be extremely useful for taxonomic purposes (Fig. 2). With a few modifications I follow the terminology introduced by Liew et al. (2014) and supplemented by Neubert & Bouchet (2015) as follows:

columellaris (c) – a lamella on the columella that extends into the interior of the shell; it may be visible in the aperture as a basal denticle, it can be smooth or can undulate or bear secondary denticles;
columellar plate (clp) – a basal broadening of the columella in the last whorl; it may be subdivided into two sections, outer plate (pointing towards the aperture), and the internal plate (pointing towards the shell's interior);
palatal structures (I use the term "internal lamellae" for them) – there can be one to several lamellae (or small denticles in non-Papuan taxa), which may be spirally or axially oriented; in constricted species these structures tend to be shifted to the base of the penultimate whorl.

Additional external conchological characters used are:

bulb – a lateral voluminous protrusion of the ultimate whorl;
constriction – a narrowing of the whorl, and the furthest point that the snail can retract the shell and therefore the point where the operculum rests. There are calcareous structures – lamellae or teeth around or inside the aperture that constrict the shell opening. The constriction is often defined by an impression on the shell wall and at the suture, in addition to a change in ribbing pattern and sculpture;

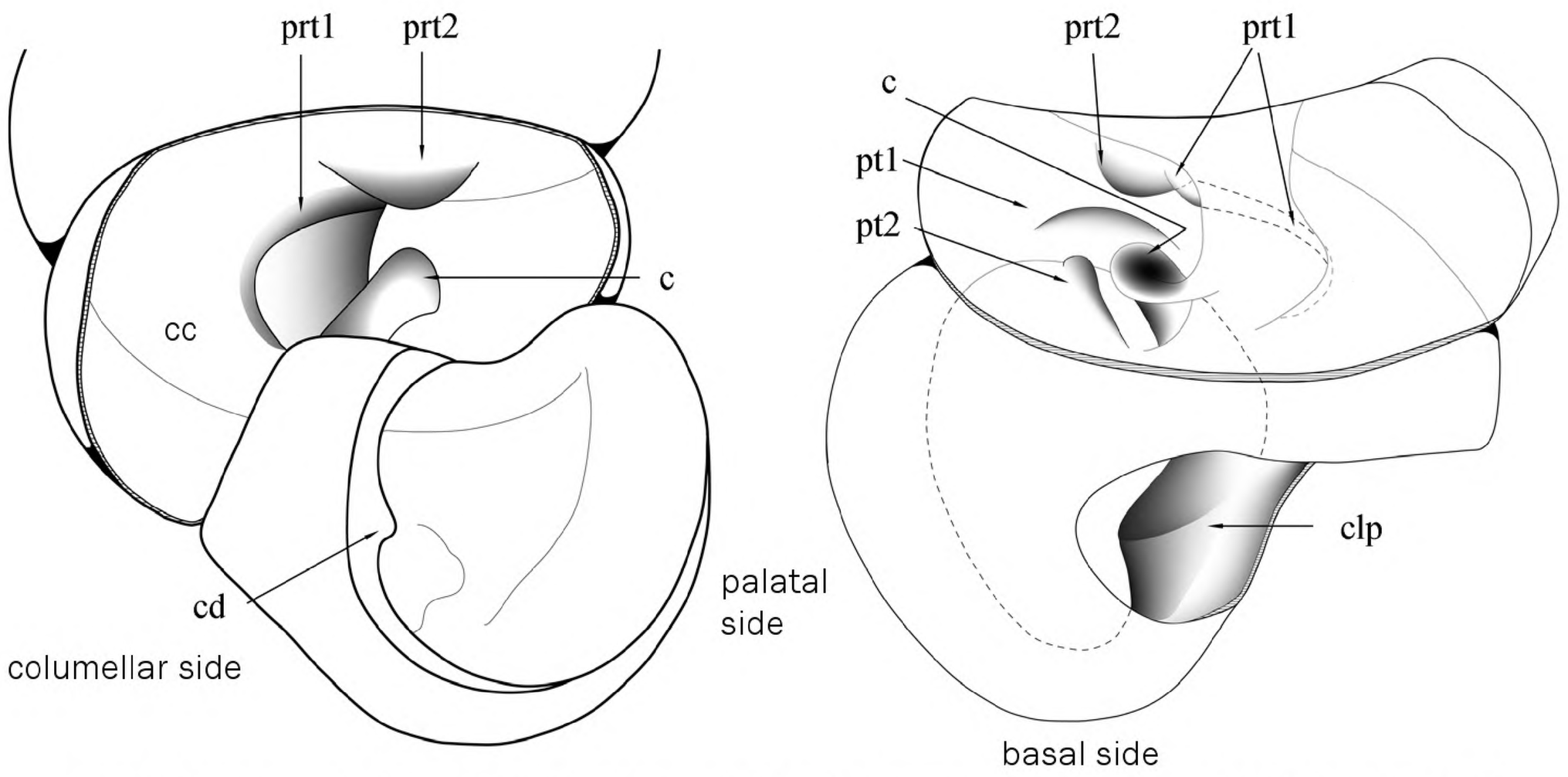


Figure 2. Terminology of the lamellae apparatus of the Diplommatinidae (after Neubert & Bouchet, 2015, with modifications).



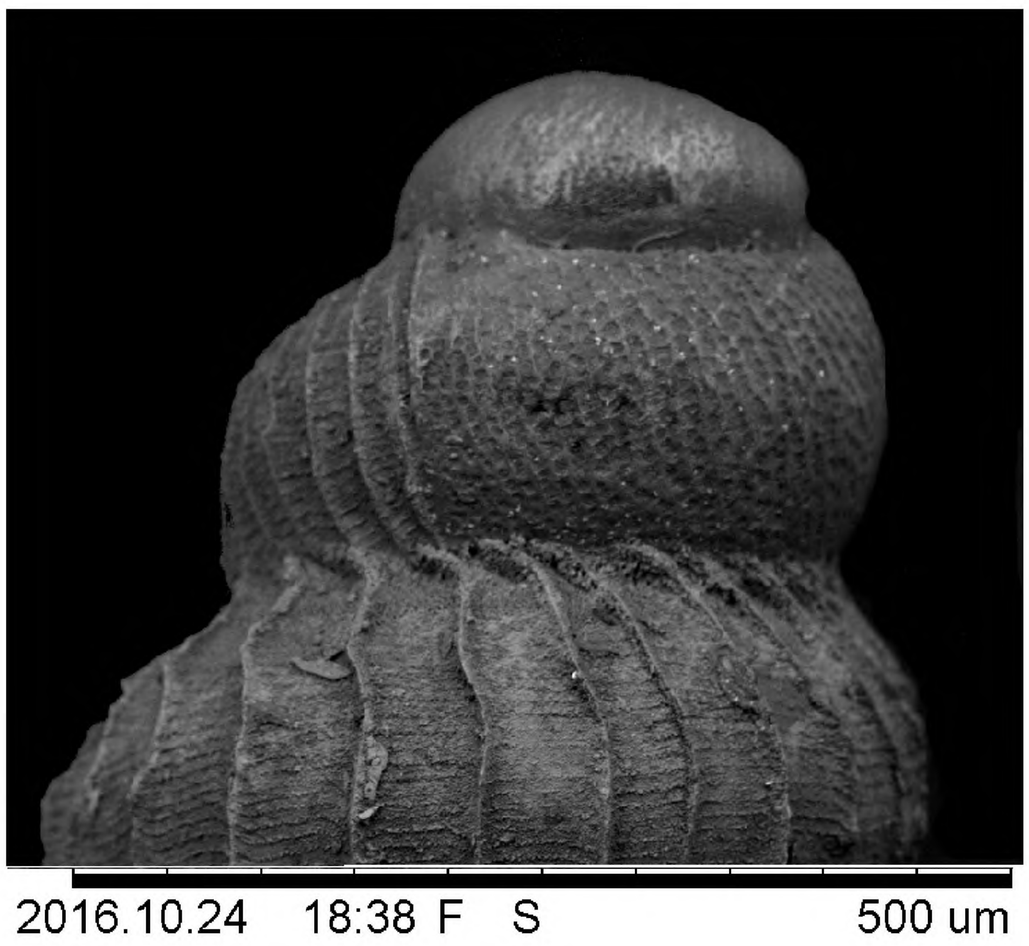
aperture and peristome – the following terms are used for apertural characters: palatal side (outer side at shell margin), columellar side (inner side along columella), parietal side (= upper side against penultimate whorl), basal side (= lower). The diplommatinid shell has either a simple or a double, rarely triple peristome, and this pattern is often species specific;

spiral striae – spiral sculpture on the teleoconch composed of raised microscopic spiral ridges. The intensity of the spiral lines depends on the size of these micro-structures (Figs 108-145);

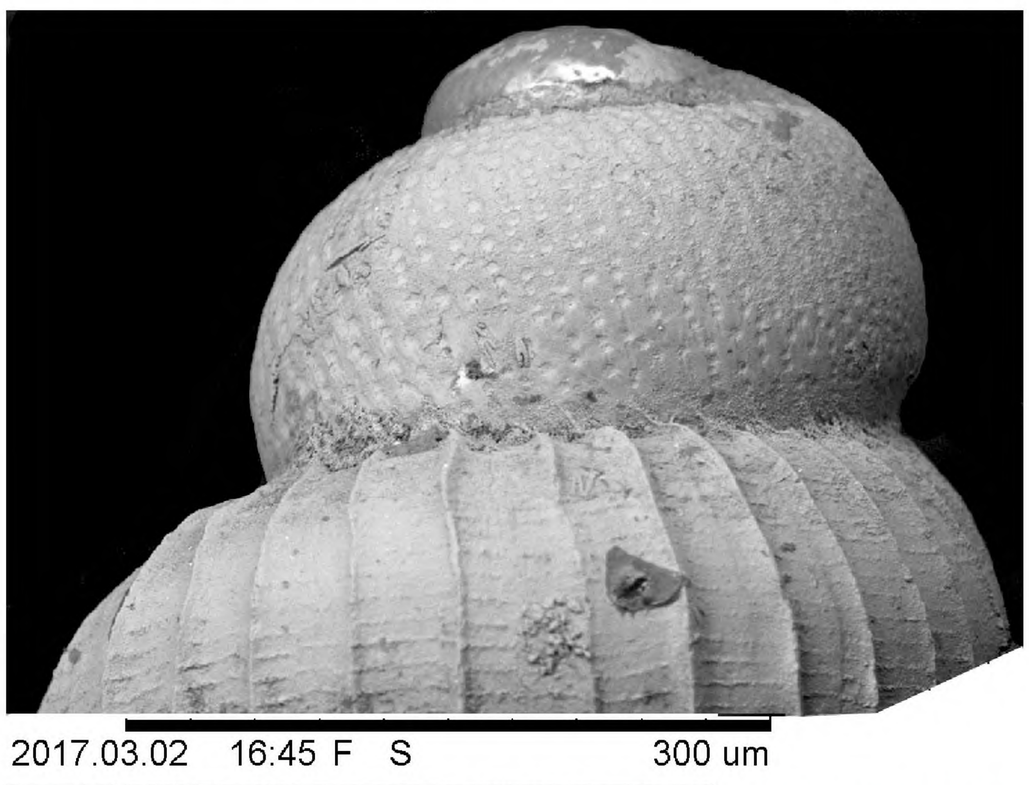
microscopic pits – mostly randomly arranged pit-like sculpture of the protoconch composed of more or less dense pits (punctures) on the embryonic whorls (Figs 3-4);

axial ribs – axial ridges caused by a change of shell ontogeny in both shell accretion direction and aperture dimensions. During rib formation, the shell material accretion direction around the aperture changes from longitudinal to orthogonal, aperture size increases and aperture shape possibly changes also. Ribs can be simple, sinuous or humped, coarse or delicate, low or high (lamella-like);

tuba – the ultimate whorl beyond the constriction.



3



4

Figures 3-4. Embryonic whorls and the first teleoconch whorl of *Diplommatina radiiformis* Preston, 1913 at 200x (Fig. 3) and 300x (Fig. 4) magnification, showing microstructures of the shell.

Abbreviations used in the Figs 1-2 and in the text (list of museum acronyms is given above):

AOO – area of occupancy (see IUCN 2016 for the definition);
EOO – extent of occurrence (see IUCN 2016 for the definition);
env. – environs;
PNG – Papua New Guinea (country);
vill. – village or little settlement;

c – columellaris (consider Fig. 2);
cc – columellar corner;
cd – columellar denticle (consider Fig. 2);
clp – columellar plate;
H – shell height including the peristome (consider Fig. 1);
HW – height of ultimate whorl (consider Fig. 1);
juv. – juvenile (not adult or subadult) specimen;
mt. – mount;
PD – maximum width of peristome (consider Fig. 1);
prt1 – inner parietalis (consider Fig. 2);
prt2 – outer parietalis (consider Fig. 2);
pt – palatalis;
pt1 – parallel palatalis (consider Fig. 2);
pt2 – perpendicular palatalis (consider Fig. 2);
µm – micrometre;
W – number of whorls inclusive embryonic ones (if shell is not decollate).

The area

The study area (Map 1) extends about 4 800 km from Lombok on the West to the easternmost Solomon Islands on the East. The study area includes the following insular systems and large islands: the classic Wallacea (the Moluccas, Lesser Sunda Islands, Timor, Tanimbar Islands, Banda Islands and Kei Islands), and the Papuan Region (New Guinea with satellite islands (Aru Islands, Cenderawasih Bay islands of Biak, Supiori, Numfoor and Yapen), Raja Ampat Islands (e.g. Batanta, Misool, Salawati and Waigeo), Bismarck and Admiralty archipelagos, as well as Louisiade Islands and D'Entrecasteaux Islands), and the Solomon Islands). Sulawesi, which is considered a part of the Wallacea, was intentionally excluded since no unstudied recent material from this island was avail-

able for the present study. Despite being a part of the Lesser Sunda Island chain, zoogeographically Bali is not a part of Wallacea and it is not included in the present study.

Despite presence of well-described significant differences in climate, geology and ecology between Lesser Sunda Islands and the Moluccas, New Guinea and the Solomon Islands, my review is not split into parts. Papuan taxa are assessed together with those from Lesser Sunda Islands.

Taxonomy

Egorov (2013) listed all known genera and subgenera of recent diplommatinid snails based on data published by earlier authors. Despite several recent studies from adjacent regions parts of the Pacific, Indo-Australian islands and Australia (Vermeulen 1991, 1993, 1996a; Clements et al. 2008; Vermeulen & Clements 2008; Stanisic et al. 2010; Webster et al. 2012; Neubert & Bouchet 2015; Yamazaki et al. 2013; Yamazaki K. et al. 2015a; Yamazaki M. et al. 2015b), modern concepts of most genera of Diplommatinidae are still lacking.

Diplommatinid (sub)genera are rather poorly defined and most conchological characters used for defining genera and subgenera by earlier authors are highly variable and may not be useful in defining generic level groupings similar to Fijian Diplommatinidae (Neubert & Bouchet 2015). A first attempt at a phylogeny of diplommatinid species was made recently (Webster et al. 2012), but no representatives from Wallacea or the Papuan Region was included.

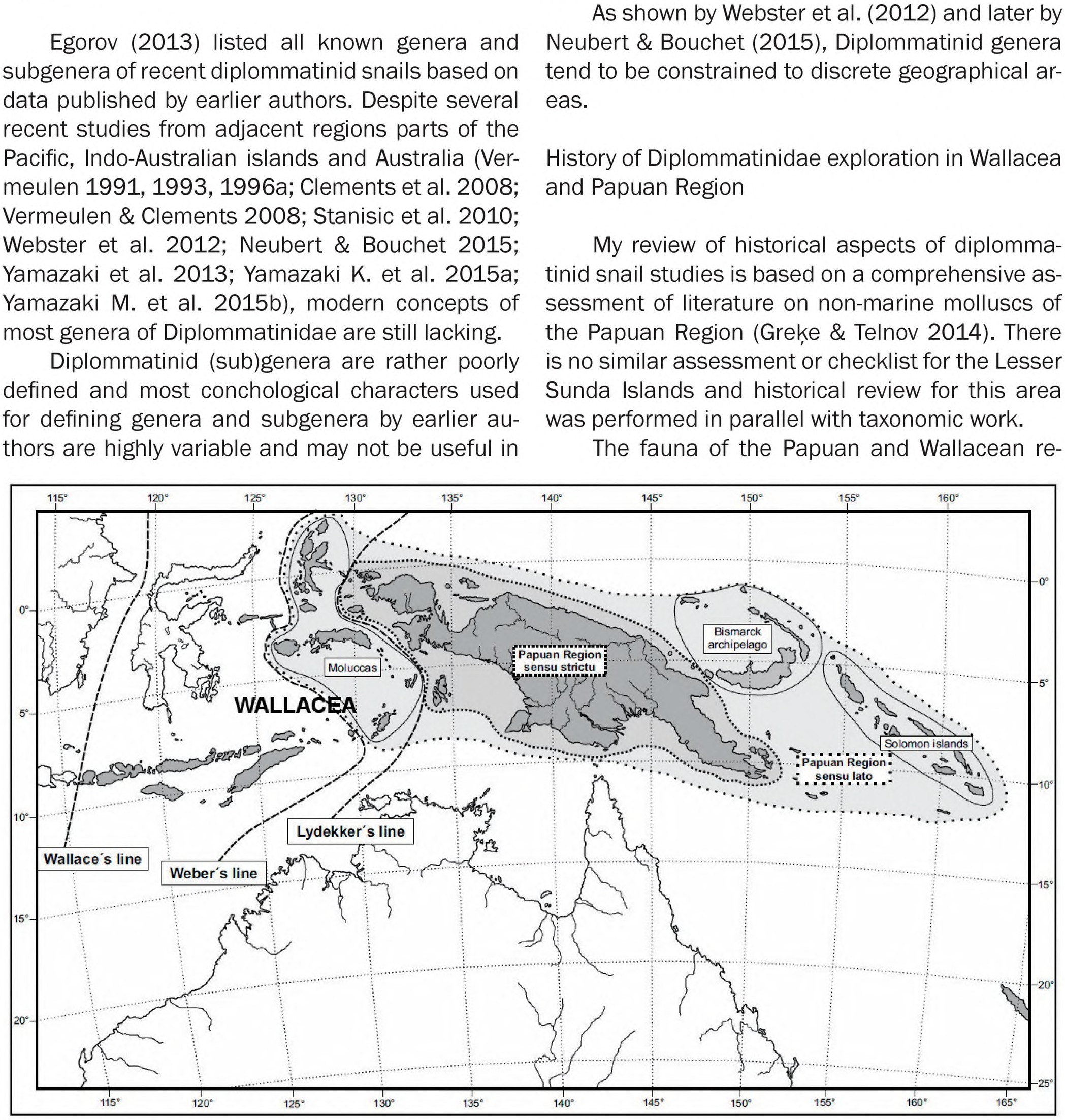
Vermeulen (1993) and Stanisic et al. (2010) used the genus name *Diplommatina* Benson, 1849 in a very broad sense for a large number of species sharing various shell characters, but Yamazaki et al. (2013) advised against such a broad definition of *Diplommatina* (Neubert & Bouchet 2015).

As shown by Webster et al. (2012) and later by Neubert & Bouchet (2015), Diplommatinid genera tend to be constrained to discrete geographical areas.

History of Diplommatinidae exploration in Wallacea and Papuan Region

My review of historical aspects of diplommatinid snail studies is based on a comprehensive assessment of literature on non-marine molluscs of the Papuan Region (Greķe & Telnov 2014). There is no similar assessment or checklist for the Lesser Sunda Islands and historical review for this area was performed in parallel with taxonomic work.

The fauna of the Papuan and Wallacean re-



Map 1. The study area - Wallacea and Papuan region, showing important zoogeographic lines. Study area is shaded in dark grey (redrawn from The Times Atlas of the World (1994), with modifications by Riedel (2002) and by the author).



gions is known from approximately 30 mostly short papers. The first description of a diplommatinid from the area contained two species (Martens 1864). Until 1955, authors described new taxa based on material collected mainly from the Moluccas, easily accessible coastal areas and offshore islands of New Guinea, and from the Solomon Islands (Fig. 5). The most important contributions to the knowledge of the area were made by Rensch (1931) and van Benthem Jutting (1958a) for Lesser Sunda Islands, and van Benthem Jutting (1958b, 1963) for the Papuan Region.

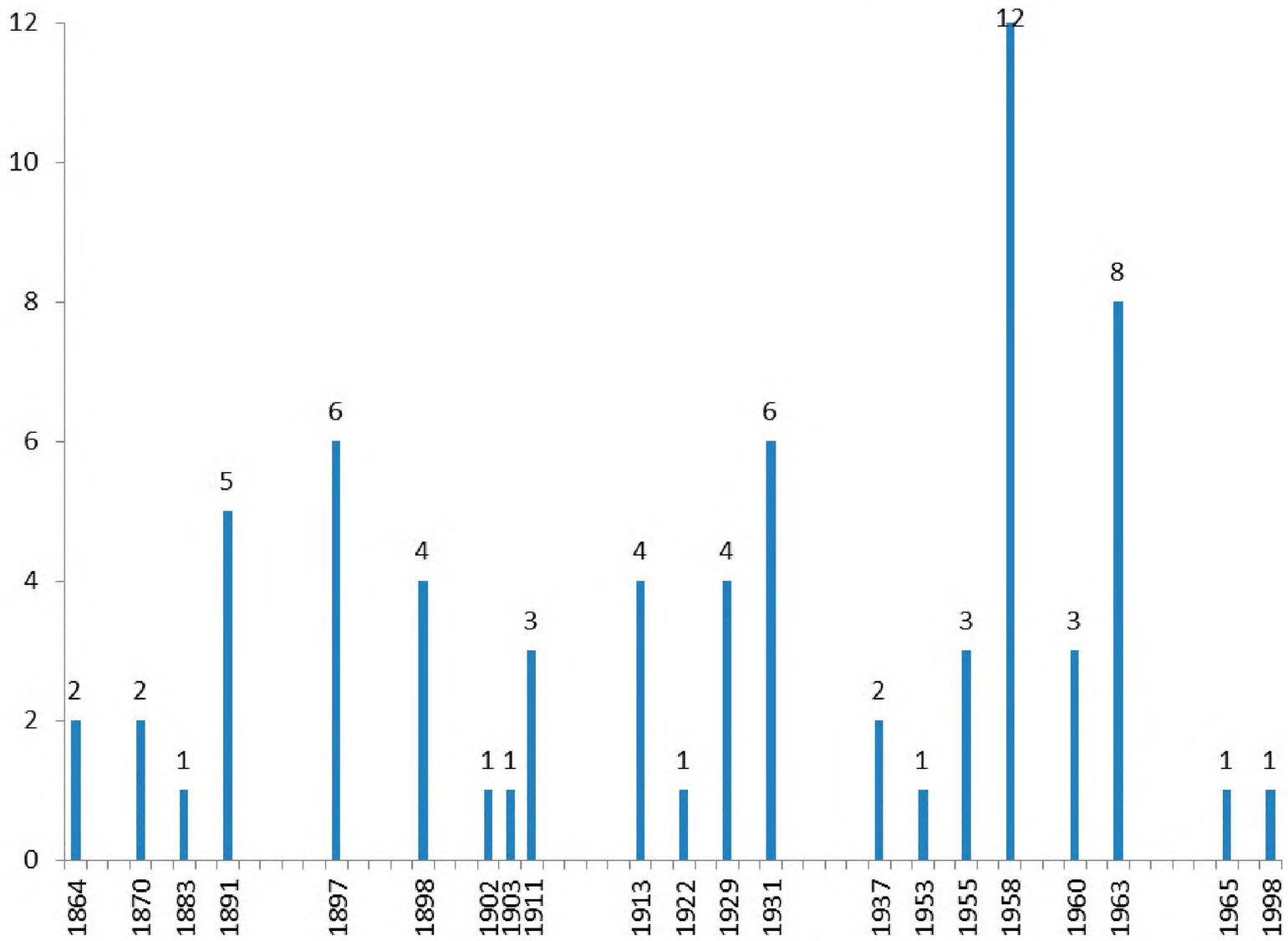


Figure 5. Chronological overview of Diplommatinidae descriptions from Wallacea and Papuan region (Sulawesi is excluded), 1864-1998.
Legends: x axis - years of publications; y axis - number of Diplommatinidae species described by years (please note the real number of species is lower since some of previously described taxa are synonymised in the present work).

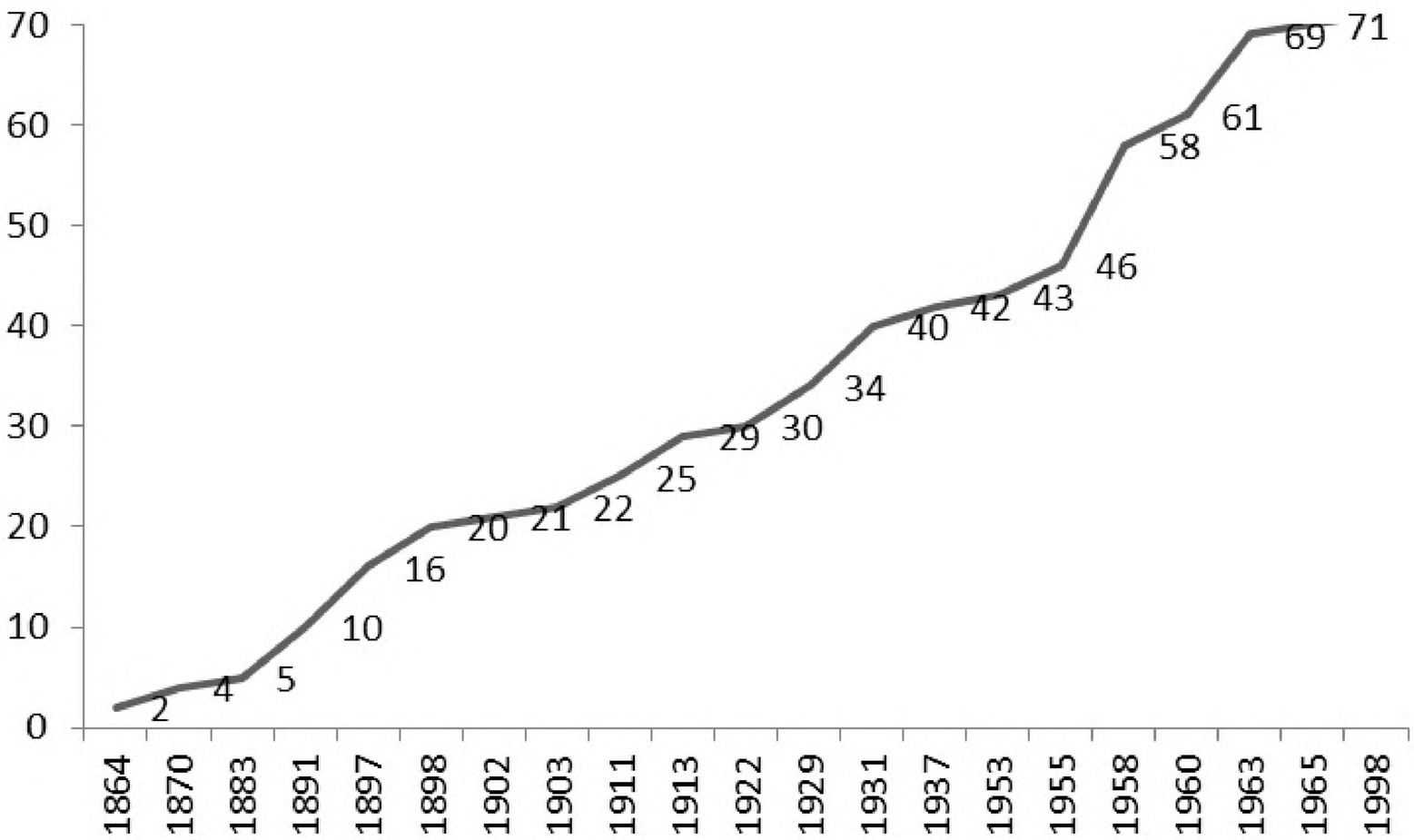


Figure 6. Cumulative number of Diplommatinidae descriptions from Wallacea and Papuan region by years (Sulawesi is excluded).
Legends: x axis - years of publications; y axis - number of Diplommatinidae species (please note the real number of species is lower since some of previously described taxa are synonymised in the present work).



Before this study, 71 diplommatinid species were reported from the study area (5 *Arinia* species, 3 *Diancta*, 14 *Diplommatina*, 6 *Moussonia*, 39 *Palaina* according to the generic concept used in this publication), among these 68 species (Fig. 6) considered endemic to the study area. Several of these species are synonymized in the present paper. For such a large and heterogeneous area, these numbers appear depauperate and probably result from the poorer sampling of the areas, especially when compared to the 42 species known from the much smaller Fiji Islands (Neubert & Bouchet 2015) and approximately 90 Diplommatinid species estimated from the even smaller Palau Islands (Rundell 2008)).

Prior to this study, Diplommatinidae material was available mainly from a limited number of mostly coastal localities (Table 1). Relatively high numbers of species were reported by earlier authors from Sumba (10 species), Misool (8), Flores (7) and northern New Guinea (7 species). This picture is changing significantly when taking into account newly discovered species described in this publication (Table 19).

Table 1. Geographical records of the Diplommatinidae from the study area prior to this study (Some of these species are synonymized with other ones in this publication).

Geographic island group	**Island or part of a large island**	**Number of described taxa**
Aru Islands		4
Bismarck Archipelago	New Britain	5
Lesser Sunda (Nusa Tenggara) Islands	Flores	7
	Lombok	1
	Sumba	10
The Moluccas (Aru & Tanimbar islands excluded)	Ambon	5
	Bacan	1
	Belangbelang	4
	Buru	2
	Haruku	3
	Obira	1
	Saparua	1
	Ternate	1
Louisiade Islands	Basilaki	1
New Guinea & Cenderawasih Bay Islands	North New Guinea	7
	Bird's Head (Doberai) Peninsula	1
	West Papua (without Bird's Head, Cenderawasih Bay islands)	4
	Biak, Owi & Yapen	6
Raja Ampat Islands	Misool	8
	Waigeo	1
Talaud Islands		1
Tanimbar Islands		4
Timor		1
Solomon Islands	Guadalcanal	1
	Nggela (= Florida)	3
	Mono	3
	Makira (= San Cristobal) & Owaraha (= Santa Ana)	2

Systematic part and new faunal information

Ten diplommatinid genera and subgenera represented by seventy one species [1] were reported for the study area prior to my studies (Table 1). The following Diplommatinidae genera and subgenera (Egorov 2013) were reported from the study area prior to this study (Table 2; next page).

1 Some of these genera and species are synonymized with other taxa in the present revision.






Table 2. Diplommatinidae genera and species reported from the study area prior to this study (Taxa are arranged alphabetically).

Genus / subgenus according to previous authors	**Initial number of species in the area**	**Reported from**
Anostomella Martens, 1867	1	Lease Islands
Arinia s. str. H. et A. Adams, 1856 & *Arinia (Leucarinia)* von Möllendorff, 1893	6	Lesser Sunda Islands, Talaud Islands
Diancta s. str. Martens, 1864 = *Diancta (Eudiancta)* Kobelt et von Möllendorff, 1898	2	North Moluccas
Diplommatina Benson, 1849 (type genus) = *Diplommatina (Eudiplommatina)* Kobelt et von Möllendorff, 1898; = *Diplommatina (Sinica)* von Möllendorff, 1885	12	Lease Islands, North Moluccas, Aru Islands, New Guinea
Diplommatina (Moussonia) O. Semper, 1865	6	Central Moluccas, New Guinea
Palaina s. str. O. Semper, 1865 = *Palaina (Eupalaina)* Kobelt et von Möllendorff, 1898; = *Palaina (Cylindropalaina)* von Möllendorff, 1897	42	Lease Islands, North Moluccas, Solomon Islands
Pseudopalaina von Möllendorff, 1897	2	Lesser Sunda Islands

Arinia s. l. **H. et A. Adams, 1856**

Type species: *Cyclostoma minor* G.B. Sowerby, 1843 (original designation)

Diagnosis: The dextral shell is cylindrical, conical or fusiform. Constriction before the tuba bears an internal transverse thickening without teeth. The aperture is not or only inconspicuously tilted upwards and lacks teeth or bears a tooth in the angular edge; rarely with the columellaris visible. The operculum with a corneous inner and a calcareous outer layer, multispiral, without concentric ridges (Vermeulen 1996a) but this character is variable among the Papuan and Wallacean taxa. According to Kobelt (1902) the tuba (the area beyond the constriction) extends half a whorl in *Arinia* and three quarters of a whorl in *Palaina*. However, this character is variable in both *Arinia* and *Palaina*. Subgenera of *Arinia* (Table 3) are poorly defined and not considered in this review.

Remark: Generic limits between *Arinia* and *Palaina* are not clear and additional data i.e. DNA sequence data will be required to more clearly define the two genera. I have not attributed any of my new species to *Arinia* since there is no comprehensive revision or good delimitation of generic characters for diplommatinids. I am not using the older genus (*Arinia*) versus later established *Palaina* primarily because I follow earlier authors on the Papuan Region who placed most of their species in *Palaina*.

Distribution: Vietnam, West Malaysia, Borneo, the Philippines, Wallacea (Sulawesi; occurrence on Nusa Tenggara and Talaud Islands needs genetic confirmation), Aru Islands, Australia. The range of this genus in the east is not clearly ascertained because of insufficiently clear delimitation towards the genus *Palaina* O. Semper, 1865.

Diversity in the study area: Five species hitherto confirmed (Table 4). Additional DNA studies required to confirm these species belong to *Arinia* or *Palaina*.

Table 3. Satellite taxa of *Arinia* H. et A. Adams, 1856 (according to Egorov 2013).

Taxon, author	**Distribution**
Leucarinia von Möllendorff, 1893	Borneo, the Philippines, Nusa Tenggara Wallacea (Sulawesi & Talaud Islands)
Notharinia Vermeulen, Phung et Truong, 2007	Vietnam, West Malaysia






Table 4. Characters matrix 1. Genus *Arinia* H. et A. Adams.

Legends: + present; – absent; 1/2 – character indistinct; ? – unknown; r = axial ribs on the penultimate whorl absent (0), straight (1), sinuous (2) or humped; rp = ribbing pattern widely-spaced throughout the teleoconch (1), dense (2) or ribbing pattern changing in different parts of the teleoconch (3); ss - spiral striae visible at 80x magnification (+) or not indicated (–); p = peristome is simple (1), double (2) or triple (3); d = dextral or s = sinistral.

Taxon \ Character	**r**	**rp**	**ss**	**p**	**d / s**
Arinia blanda	1/2	2	+	2	d
Arinia crassiventris	0	3	-	1	d
Arinia patagiata	3	3	-	2	d
Arinia talautana	1	1	+	2	d
Arinia tjendanae	0	3	-	3	d

Arinia (s. l.) ***blanda*** **E.A. Smith, 1897** (Plate 30 figs 10-13)

Lectotype BMNH [herewith designated]: ~~Arina~~ [corrected by hand] Arinia blanda, Smith I. Flores, 4000 ft. SM 8.3.80-2 [handwritten] / blanda, Smith I. Flores [handwritten].

Paralectotypes 2 adults BMNH [herewith designated]: same labels as lectotype.

Lectotype designation: Paralectotypes and lectotype are selected from a lot of 3 syntypes, but this lot does not have any label saying these specimens are (syn)types (J. Ablett, personal communication).

References: Smith E.A. (1897a: 627); Kobelt & von Möllendorff (1898: 131), checklist, as *Arinia* Subgen. *Leucarinia* Mlldff. *blanda*; Kobelt (1902: 392), as *A.[rinia] (L.[eucarinia]) blanda*; Rensch B. (1931: 392).

Measurements: Lectotype H = 2.1, D = 1.1 mm, HW = 1.2 mm, PD = 0.7 mm.

Description: Shell is small, white, dextral, cylindrical with flattened apex. Shell with 5½ convex whorls, the $1^{1}/_{3}$ embryonic whorl is microscopically pitted. The suture is moderately deeply impressed. The ultimate whorl is slightly constricted in apertural view, slightly narrower than the penultimate whorl. The umbilicus is closed in adult. Whorls are oblique with regard to the coiling axis. The constriction is not defined on shell wall. The constriction is more or less centered in apertural view. The teleoconch whorls are sculptured with delicate dense straight to slightly sinuous axial ribs. The ribs becoming coarser and more widely spaced on the last half whorl. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are about 15-17 ribs per 0.5 mm. Spiral striae delicate and dense on early whorls, not or almost not indicated on the penultimate and ultimate whorls. The aperture is circular, apertural rim is entire. The aperture is tilted about 10° to the coiling axis. In apertural view the aperture is more or less central below the coiling axis. The peristome is double, thin in lateral view, the inner and outer peristomes almost fused. The parietal margin of the peristome is attached to the ultimate whorl. The palatal margins of both peristomes are slightly sinuous. No specimens were available to study the internal lamellae. Operculum is unknown.

Ecology: Unknown.

Distribution: Lesser Sunda Islands: Flores Island. Exact locality is unknown for this species, therefore a distribution map is not given.

Conservation status: Data Deficient, DD. There is not enough data available to calculate current EOO and AOO. The maximum EOO for this species estimated about 9000 km^2 taking into account the area of Flores and the distribution of remaining rainforests on this island. This species is known from the small type series collected from one locality over 120 years ago and has not been collected again. The population size and trend are unknown. The main threat is unknown for this speies. Between 2001 and 2014, Flores has lost over 17000 ha of the rainforest (calculated for canopy density over 25% according to the Global Forest Watch (2016)), primarily in lowland forests. Further research is required to assess the distribution of this species, its population size, trend and threats.

Arinia (s. l.) ***crassiventris*** **B. Rensch, 1931** (Plate 30 figs 18-20, map 12)

Holotype MHUB: Sunda-Expedition Rensch Fundort: [printed] Waingapoe, Sumba Kambera-Genist [handwritten] Datum: [printed] 27.7.27 [handwritten] No: [printed] / Zoolog. Museum Berlin [printed] Arinia crassiventris Rensch* Waingapoe, Sumba 27.7.27. Kambera Genist 75443 Rensch leg [handwritten] / Zoolog. Museum Berlin. Typus von: [printed] Arinia crassiventris Rensch Zool. Jahrb. Syst., 61, p. 392, Fig. 18, 1931 [handwritten] [label red].

References: Rensch B. (1931: 392); Rensch B. (1933: 496); van Benthem Jutting (1958b: 94); Monk et al. (1997: 395).

Measurements: Holotype H = 4.2 mm, D = 3.05









mm, HW = 2.7 mm, PD = 1.7 mm.
Description: Shell is large, white, dextral, obese cylindrical with pointed apex. Shell with 6 convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is strongly constricted, it is as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The penultimate and the ultimate whorls are oblique with regard to the coiling axis. The constriction is not defined on shell wall. The position of the constriction is unknown since the shell is not translucent. Teleoconch smooth on younger whorls, ribs extremely delicate and poorly defined as dense axial striation. The ribs are more distinct and more widely-spaced on the 2nd and 3rd whorls. There are no abrupt changes in the ribbing pattern. The ribs are oblique to the coiling axis. Spiral striae are lacking. The aperture is tilted about 15-20° to the coiling axis, semicircular, apertural rim is entire. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is simple, its columellar margin slightly sinuous. The parietal side of the peristome is pressed against the parietal wall, attached to it. No specimens were available to study the internal lamellae. Operculum is unknown.
Ecology: Specimens reported from light, dry secondary forest, collected under pieces of wood and in leaf litter.
Distribution: Lesser Sunda Islands: Sumba Island.
Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO for this species. The current AOO is 8 km^2 but the maximum AOO is likely much higher. This species is known from a couple of specimens collected from two localities over 50 years ago. The population size and trend are unknown. The main threat is unknown for *Arinia crassiventris*. Further research is required to clarify status of this species in the wild, assess its distribution, population size and trend, and highlight threats.

Arinia (s. l.) ***patagiata*** **van Benthem Jutting, 1958**
(Plate 30 figs 21-23, map 12)
Holotype NHMB: Arinia patagiata Stal. 575 Holotypus [handwritten] / 6078a Sumba,Waikarudi [printed] / HOLOTYPUS [printed, label pink, glued on glass of the store box].
Paratype 1 subadult NHMB: Arinia patagiata nsp. Paratype [handwritten] / Naturhist. Museum Basel Coll. Dr. Bühler Dr. Sutter 1949 Waikarudi Sumba 575 [printed] / 6078 a Sumba,Waikarudi [printed] / PARATYPOID [printed, label light green, glued on glass].
References: van Benthem Jutting (1958b: 94, pl. 1 fig. 1); Monk et al. (1997: 395).
Measurements: Holotype H = 2.9 mm, D = 1.65 mm, HW = 1.7 mm, PD = 1.4 mm.
Description: Shell is small, whitish, dextral, cylindrical with conical apex. Shell with 5¾ very convex whorls, the 2 embryonic whorls are microscopically pitted. The suture is very deep. The ultimate whorl is constricted, it is as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is not defined on shell wall. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse, very widely-spaced, strongly sinuous and partly humping ribs. Upper parts of the ribs are bent to a coiling direction. The ribs becoming denser at the constriction, but are more widely spaced on the last half whorl. These changes in ribbing pattern are rather abrupt. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. Spiral striae are lacking. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, thin in lateral view. The parietal margin of the peristome is attached to the ultimate whorl. The margins of the inner peristome are not sinuous. The outer peristome is broadly discontinued parietally, broadly expanding beyond inner peristome and consists of few coarse lamellae, its palatal margin is not or slightly sinuous. No specimens were available to study the internal lamellae. Operculum is unknown.
Ecology: Type specimens were sampled from creek valley from under decaying wood.
Distribution: Lesser Sunda Islands: Sumba Island.
Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. The maximum EOO estimated at least 11100 km^2 taking into account the area of Sumba and adjacent islets. The population size and trend are unknown. The main threat for this species is unknown. It is likely that loss of the habitat is a very significant threat for this species, but this needs confirmation. Further research is required to clarify status of *A. patagiata* in the wild, assess its distribution, calculate population size, trend and highlight threats for this species.

Arinia (s. l.) ***talautana*** **(Fulton, 1899)** (Plate 30 figs 14-17)
Lectotype BMNH [herewith designated]: Dip. (Arinia) talautana Fulton Talaut [sic!] Isl TYPE 48-12-3-227-229






[handwritten] / Type. [printed] / talautana, Fulton. Talaut. [handwritten].
Paralectotypes 4 adults [herewith designated]: 2 BMNH: same labels as lectotype; 2 FMNH: 25287 [printed] / 25287 FIELD MUSEUM OF NATURAL HISTORY MOLLUSCA: DIPLOMMATINIDAE 2 dry spec. Syntype(s): Diplommatina (Arinia) talautana Fulton, 1899 Sta. FMNH25287, Indonesia, Talaut Islands ex W.F. Webb ex Sowerby & Fulton (Acc.# 7129) [printed].

Lectotype designation: Paralectotypes and lectotype are selected from a lot of 5 syntypes in BMNH and FMNH.
References: Fulton (1899: 214, 217, pl. 11 fig. 13), as *Diplommatina (Arinia) Talautana*; Kobelt (1902: 393), as *A.[rinia] (L.[eucarinia]) talautana*; Monk et al. (1997: 395).
Measurements: Lectotype H = 2.65 mm, D = 1.4 mm, HW = 1.5 mm, PD = 1 mm. Selected paralectotype from FMNH: H = 2.4 mm, D = 1.3 mm, HW = 1.4 mm, PD = 1 mm.
Description: Shell is small, whitish to creamy coloured, dextral, cylindrical with flattened apex. Shell with 5¼ convex whorls, the 1 embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is slightly constricted, as wide as the penultimate whorl in apertural view. The umbilicus is extremely narrowly open and perspective in adult. The constriction is poorly defined by a short impression. The constriction situated on same axis with the columellar side of the aperture. The teleoconch is sculptured with coarse, widely-spaced, straight ribs. The ribs becoming somewhat coarser and much more widely-spaced on the last half whorl. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls. The ribs are oblique to the coiling axis. There are about 9-11 ribs per 1 mm. Spiral striae are distinct, delicate and dense. The aperture is tilted about 10-15° to the coiling axis and is circular and has entire apertural rim. The aperture is slightly shifted right against the coiling axis in apertural view. The peristome is double, thin in lateral view and consists of a few strong lamellae. The parietal margin of the peristome is pressed against the shell wall, attached to the ultimate whorl. The margins of the inner peristome are not sinuous. The outer peristome broadly discontinued parietally. The palatal margin of the outer peristome is slightly sinuous. No specimens were available to study the internal lamellae. The operculum is derivative, with rather long hollow cylindrical median process on the outer surface.
Ecology: Unknown.
Distribution: Talaud Islands. Record from Ternate (North Moluccas) by Monk et al. (1997: 395) is definitively an error. Distribution map is not given.
Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. The maximum EOO for this species estimated 4000 km^2 taking into account the area of Talaud Islands. This species is known from small type series sampled from one site over 120 years ago and has not been reported again. The population size and trend are unknown. Threats are unknown for this species. Further research is required to clarify status of *A. talautana* in the wild, assess the distribution, calculate population size, trend and highlight threats for this species.

Arinia (s. l.) ***tjendanae* B. Rensch, 1931** (Figs 37-38, 105a-b, 140-141, plate 29 figs 13-17, maps 12, 15)

Syntypes 14 adults MHUB: Sunda=Expedition Rensch Fundort: [printed] Waingapoe, Sumba Kambera-Genist [handwritten] Datum: [printed] 27.7.27 [handwritten] No. [printed] / Zoolog. Museum Berlin [printed] Arinia (Leucarinia) thendanae Rensch* Waingapoe, Sumba Kambera Genist 27.7.27 75446 Rensch [handwritten] / Zoolog. Museum Berlin. Typus von: [printed] Arinia (Leucarinia) thendanae Rensch Zool. Jahrb. Syst., 61, P. 393, Fig. 19, 1931 [handwritten, label red].
Additional material 5 adults NMNL: Coll. J.J. Vermeulen, nr. 4147 Arinia cf. Tjendanae Rensch 1931 Diplommatinidae INDONESIA, Aru Islands, Pulau Kobroor, N. of Kobroor. Primary rainforest, base of outcropping fossil coral reef. Leg. H. Turner & M. v. Balgooij, 25/04/1993.

References: Rensch B. (1931: 393), as *Arinia (Leucarinia) tjendanae*; Rensch B. (1933: 496), as *Arinia (Leucarinia) tjendanae*; van Benthem Jutting (1958b: 94); Vermeulen (1996c: 109, 112); Monk et al. (1997: 395).
Measurements: Selected syntype H = 1.8, D = 0.9 mm, HW = 0.9 mm, PD = 0.6 mm. All specimens from Aru Islands are generally larger: H = 2.1, D = 1 mm, HW = 1.15 mm, PD = 0.8 mm; H = 1.95, D = 0.9 mm, HW = 1.1 mm, PD = 0.8 mm.
Description: Shell is very small to small, white, dextral, high cylindrical with flattened apex. Shell with 5¼-5½ convex whorls, the 1½ embryonic whorl is smooth (no microscopic sculpture visible by 300x magnification). The suture is moderately deeply impressed. The ultimate whorl is as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by an inconspicuous impression and suture becoming somewhat deeper above the of constriction. The constriction is more or less centered in apertural view. Teleoconch smooth with very deli-






cate axial striations on both the penultimate and the ultimate whorls, but with very delicate and very widely-spaced straight axial ribs on earlier whorls. There are no abrupt changes in the ribbing pattern. Spiral striae are lacking. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is distinctly triple in larger specimens (the outer peristome is double), double with less conspicuous median (third) lamella in smaller specimens. The parietal margin of the peristome is attached to the ultimate whorl. The outer peristome is broadly discontinued parietally. Peristomal margins are not sinuous. The columella is shiny and moderately broad with a small median knob (the knob is less conspicuous in smaller shells). Operculum is unknown.

Ecology: Specimens occur in moist rainforest soil and leaf litter, as well as under decaying wood. On Aru Islands this species inhabits base of limestone outcrops in primary lowland rainforests.

Distribution: Lesser Sunda Islands: Sumba Island; Aru Islands: Kobroor Island.

Conservation status: Data Deficient, DD. The EOO inclusive nearly 60 years old records is about 45000 km^2, but not enough data available to calculate the current EOO. The maximum EOO estimated at least 165000 km^2 and includes whole of Sumba and at least Kobroor of Aru Islands. The current AOO is 4 km^2, however the maximum AOO is likely much higher. The population size and trend are unknown. According to van Benthem Jutting (1958b), this species was locally common on Sumba. The main threat to this species considered decline and altering of the habitat, but this needs confirmation. Further research is required to assess the distribution and calculate population size, uncover ecology of *A. tjendanae* and highlight threats for this species.

Diancta s. str. **Martens, 1864**

Type species: *Diplommatina constricta* Martens, 1864b (by monotypy)

= subgenus *Eudiancta* Kobelt et von Möllendorff, 1898 (objective synonym)

Remark: The name *Eudiancta* was introduced by Kobelt and von Möllendorff (1898) as an unnecessary replacement for *Diancta*.

Diagnosis: The penultimate whorl is bulbous and the ultimate whorl is constricted. Internal lamellae apparatus conspicuous due to the presence of several longitudinal palatalis.

Distribution: From North Moluccas to Fiji. There are currently no records from New Guinea and the Solomon Islands. Subgenus *Paradiancta* von Möllendorff, 1895 occurs on the Philippines and Greater Sunda Islands (Borneo in particular) (Egorov 2013).

Diversity in the study area: Five species hitherto confirmed (Table 5).

Table 5. Characters matrix 2. Genus *Diancta* Martens.

Legends: + present; – absent; 1/2 – character indistinct; ? – unknown; r = axial ribs on the penultimate whorl straight (1) or sinuous (2); rp = ribbing pattern widely-spaced throughout the teleoconch (1), dense (2) or ribbing pattern changing in different parts of the teleoconch (3); ss - spiral striae visible at 80x magnification (+) or not indicated (–); p = Peristome is simple (1) or double (2); pt = number of palatalis (l - longitudinal, t - transverse); d = dextral or s = sinistral.

Taxon \ Character	**r**	**rp**	**ss**	**p**	**pt**	**d / s**
Diancta constricta	1/2	1	+	2	0	s
Diancta halmaherica	1	2	-	2	4(l)	s
Diancta multiplicata	1	2	-	2	?	s
Diancta obiensis	1	1	-	2	1(t)	s
Diancta torta	2	1	-	2	4(l)	s

Diancta (s. str.) ***constricta* (Martens, 1864)** (Fig. 8, plate 19 figs 1-10, map 5)

Lectotype MHUB [herewith designated]: Ternate [handwritten] / Zoolog. Museum Berlin [printed, text bold & underlined] Diplommatina constricta Marts. * Ternate v. Martens 4826 a Martens leg [handwritten] / Zoolog. Museum Berlin [printed, text bold & underlined] Diancta constricta Marts. * Ternate Molukken 4826 b Martens [handwritten].

Paralectotypes 9 adults MHUB [herewith designated]: same labels as lectotype; 1 adult SMF [104 902]: Ternate [not studied] [two shells are broken].

Additional material: 4 adults, 2 juv. KGC: INDONESIA E, North Moluccas, Tidore Is., [outer slope of] caldera of Sabale volcano, 0°43'20"N, 127°26'16"E, 450-530 m, 29.VI.2013, secondary lowland rainforest, leaf litter, leg. K.Greķe.

Lectotype designation: Syntype specimens of *D. constricta* in MHUB are glued on a paper card









and arranged in three rows by three specimens. The central specimen in the upper row (according to the position of shells - apex up) is selected as the lectotype.

References: Martens (1864a: 119), as *Diplommatina* Gruppe *Diancta constricta*; Pfeiffer (1865: 11); Martens (1867: 164, pl. 4 fig. 19), as *Diplommatina* Gruppe *Diancta constricta*; Nevill (1878: 290), as *Diplommatina (Diancta) constricta*; Ancey (1887: 278); Smith E.A. (1896: 121), checklist; Kobelt & von Möllendorff (1898: 135), checklist, as *Diancta* subgen. *Eudiancta constricta*; Kobelt (1902: 420); Wenz (1938: 483); Zilch (1953: 17, pl. 6 fig. 85); van Benthem Jutting (1959: 29, 50); Monk et al. (1997: 395); Egorov (2013: 25); Neubert & Bouchet (2015: 8).

Measurements: Lectotype H = 4.6 mm, D = 2.7 mm. Selected paralectotypes: H = 4.7 mm, D = 2.8 mm; H = 4.7 mm, D = 2.6 mm. Selected specimens from Tidore: H = 4.8 mm, D = 2.4 mm, HW = 2.2 mm, PD = 1.9 mm; H = 4.7 mm, D = 2.4 mm, HW = 2.7 mm, PD = 1.85 mm.

Description: Shell is large, creamy whitish to pale yellow, sinistral, elongate, and rather broadly conical. Shell with 6½ strongly convex whorls, the 1½ embryonic whorl is microgranulate. Shell apex is distinctly convex. The suture is rather deeply impressed. The penultimate whorl is large, strongly bulbous. The ultimate whorl is constricted, descending, it is much narrower than the penultimate whorl in apertural view. The well-defined and distinctly impressed constriction is situated in the middle of the abapertural side of the shell. The umbilicus is closed in adults. The teleoconch is sculptured with coarse, widely spaced and slightly sinuous axial ribs on the early and central whorls. The ribs are delicate and abruptly denser prior to the constriction becoming coarse and widely spaced on the last half of the ultimate whorl. The ribs are not or only partly synchronized with those on the previous whorls. The ribs are oblique to the coiling axis. There are 6-7 ribs per 1 mm, but 8-9 ribs on the apertural side of the ultimate whorl above the aperture. In fully grown specimens ribs becoming much higher (somewhat paddle-like) near the suture. Extremely delicate and very dense spiral striae on the teleoconch are visible at 48x magnification. The upper and lower sides of the penultimate whorl are more or less parallel in apertural view. Aperture is not tilted against the coiling axis, is circular (but columellar side is nearly straight in certain Tidore specimens), apertural rim is entire. The aperture is shifted left against the coiling axis in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is double (this is barely visible in old specimens). The inner peristome forms a continuous polished callus. The region beyond the outer peristome on the ultimate whorl is marked with dense high sinuous axial ribs. The outer peristome is somewhat angulate at palatal / parietal junction in fully grown specimens. No palatalis and parietalis present. The columella is shiny, obliquely twisted and forming a flat columellaris coiling into the interior of the shell. The operculum is circular, thick in lateral view, flat with spiral lines on the inner surface and with a broad hollow tubular projection on the outer side. The projection is constricted toward the apex.

Phylogeny: Tidore specimens of this species fall within clade E of Webster et al. (2012) and demonstrates some relationship with here described Papuan *Diplommatina telnovi* sp. nov. (consider chapter “Phylogeny”).

Ecology: Tidore Island specimens were sampled from the underside of wet fallen leaves in leaf litter accumulated in a large depression in the rock. Specimens observed in shady and wet secondary lowland rainforest on the slope of an old, overgrown caldera (clay soil).

Distribution: North Moluccas: Ternate, Tidore.

Conservation status: Endangered, EN B1ab(ii),B2ab(iii). The current EOO is ~40 km^2, AOO - 12 km^2. This species is known from two small islands with active volcanoes with a dense and growing human population. It is likely *D. constricta* also occurs on neighbouring islands (for example, Hiri, Moti, and the western arms of Halmahera). This species’ EOO and AOO are likely at least twice what is currently known, but definitively below 500 km^2 for AOO. This species was historically collected in primary forests, but is now limited to secondary forests (primary rainforest has not existed on either island for more than 100 years). The main threat is habitat loss as remaining secondary lowland rainforest is cleared due to the expansion of human settlements (on Ternate island), wood consumption for various purposes (on both Ternate and Tidore islands) and conversion of rainforest into gardens and plantations (on both Ternate and Tidore). Considering the size of the EOO and its location on active volcanoes (patches of rainforest only present on volcanic slopes above 400 m), a very large volcanic eruption on one of the islands may in theory destroy half of the current EOO (but considering the geological past of both Ternate and Tidore, such a super-eruption is very unlikely). This species is known from two locations. The population is not severely fragmented as the minimum distance between the islands is just 2.2






km. Despite the distance being so short, gene flow between subpopulations considered very low due to absence of the habitat (forests) along the coast. Snails can potentially travel on floating material between two islands, but absence of suitable habitats along the coastline makes re-colonization very difficult. Transportation by birds or human (with substrate or plants) from one island to another is the most realistic scenario for gene exchange. Continuing decline is observed in extent and quality of habitat. Remaining lowland rainforests on Ternate and Tidore to be protected and green corridors between remaining forest patches to be maintained. Further search for *D. constricta* localities is required on neighbouring Hiri, Mare, and Moti islands and on western Halmahera.

Diancta (s. str.) ***halmaherica*** **sp. nov.** (Fig. 9, plate 20 figs 1-10, map 5)

http://zoobank.org/EAEA5341-4486-4E36-9C14-058344ED1E02

Holotype NME: INDONESIA, prov. Maluku Utara (North Moluccas), Halmahera tengah (Central), Weda Selatan dist., Loleo vill. SW env., Tilope vill. env., 0°13'58,16"N 127°54'27,18"E, 12.IX.2007, limestone cave, soil sample, leg. K.Greķe.

Paratypes 6 specimens: 1 adult, 1 juv. KGC INDONESIA, prov. Maluku Utara (North Moluccas), Halmahera tengah (Central), Weda Selatan dist., Loleo vill. S env., Tilope vill. 10 km SW, way to Oham region, Gunung Talaga mt., ~100-150 m, 0°13'15,10"N 127°53'28,25"E, 13.IX.2007, primary & secondary lowland rainforest on limestone, leg. K.Greķe; 1 adult & 1 juv. NME, 2 adults KGC: INDONESIA E, North Moluccas, central Halmahera, valley of creek Moreala E of Weda, 0°19'47"N, 127°49'57"E, 200-210 m, 06.VII.2013, primary lowland rainforest on limestone, leaf litter, leg. K.Greķe.

Derivatio nominis: Toponymic. The name derives from the locus typicus, north Moluccan Island of Halmahera.

Measurements: Holotype H = 5.9 mm, D = 3 mm, HW = 2.4 mm, PD = 2.2 mm. Selected paratypic specimen from Tilope vill. env. H = 5.6 mm, D = 2.5 mm, HW = 2.4 mm, PD = 2 mm. Selected paratypic specimen from Moreala creek valley: H = 6.2 mm, D = 3 mm, HW = 2.8 mm, PD = 2.5 mm.

Description: Shell is large, pale brown to cream, sinistral, elongate, and rather narrowly conical with conical apex. Shell with 7-7½ moderately convex whorls, the 1½ embryonic whorl is smooth. The suture is rather deeply impressed. The penultimate whorl is slightly bulbous. The ultimate whorl is constricted and descending, in apertural view narrower than the penultimate whorl. The umbilicus is closed in adults. The deep and well-defined constriction is located on the abapertural side of the shell. The teleoconch is sculptured with widely spaced, sinuous axial ribs on the early and central whorls (holotype specimen with almost straight ribs on the apertural side of the penultimate whorl). There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those on previous whorls. The ribs are oblique to the coiling axis. There are 10-12 ribs per 1 mm (specimens from Moreala creek valley have 11-12 ribs per 1 mm). Spaces between ribs are smooth to finely granulate, without spiral striae at 80x magnification. The upper and lower sides of the penultimate whorl are not parallel in apertural view. The aperture is not tilted against the coiling axis, is oval and has entire apertural rim. The aperture is shifted left against the coiling axis in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is double, the outer peristome has a wide zone of dense irregularly sinuous growth lines in left lateral view. The inner peristome forms a continuous polished callus, its margins are not sinuous. The outer peristome is shifted backward on basally. The palatal and basal margins of the outer peristome are strongly sinuous. Four long longitudinal palatalis present beyond the constriction. The columella is simple and broad. The operculum is circular, with spiral lines on the inner surface forming a short and broad hollow median tube on the outer surface.

Differential diagnosis: Compared to other Moluccan congeners, the shell of *Diancta halmaherica* sp. nov. is slender. The shells of *D. constricta* (Martens, 1864) and *D. torta* O. Boettger, 1891 are significantly broader. The upper and lower suture of the penultimate whorl of *D. halmaherica* sp. nov. are not parallel in apertural view. While the sutures of *D. constricta, D. multiplicata* von Möllendorff, 1902, *D. torta* are parallel or nearly parallel. The penultimate whorl of *D. halmaherica* sp. nov. is not or weakly bulbous unlike the strongly bulbous penultimate whorl of *D. constricta* and *D. torta*. The penultimate whorl is almost as wide as previous whorl in apertural view in *D. halmaherica* sp. nov. The penultimate whorl distinctly wider than the previous whorl in *D. constricta, D. multiplicata*, and *D. torta*. The constriction of the penultimate whorl is situated clearly abaperturally, not as in *D. constricta, D. multiplicata*, and *D. torta* where the constriction is shifted aperturally. In *D. torta*, the upper palatalis is shorter than the three lower palatalis while teeth have the same length in *D. halmaherica* sp. nov. The tubular projection of the operculum is









shorter and less broad in *D. halmaherica* sp. nov. than in *D. constricta*.
Ecology: Specimens inhabit in leaf litter of primary lowland rainforest on limestone soil and in secondary rainforest at the base of limestone rocks.
Distribution: North Moluccas: southern arm of Halmahera.
Conservation status: Vulnerable, VU B1ab(iii),-B2ab(iii). The current EOO is 14 km^2. The maximum EOO for this species is 4000 km^2 considering this species' possible distribution limit on the southern arm and in central Halmahera and the distribution of limestone soils in this region. The current AOO is about 8 km^2. It is very unlikely that this species occurs throughout central and southern Halmahera (but definitively not on SE arm of Halmahera where the research was carried out in 2013 by the Entomological Society of Latvia and this species was not found). Considering the amount of available habitat - primary and secondary lowland rainforest on limestone soil the AOO likely is higher but certainly below 500 km^2. Habitat loss and decline in habitat quality caused by logging, conversion of the forest into gardens and plantations, and expansion of settlements in lowland areas considered the main threats for this species. The forested part of the maximum EOO is decreasing. Between 2001 and 2014 about 16000 ha of the rainforest were lost in this area (calculated for 25% canopy density according to the Global Forest Watch (2016)) and this forest continues to decline in extent and quality. Considering the rapidly growing human population on Halmahera, this trend is likely to continue. The population is not severely fragmented. There are 2 locations. Further research on Halmahera is necessary in order to clarify species' distribution and assess its population size and trend.

Diancta (s. str.) ***multiplicata*** **von Möllendorff, 1902** (Plate 19 figs 11-13)

Holotype SMF: Diancta multiplicata Mdf Obi [handwritten] / Senckenbg.Mus. [printed] 104901/1 [handwritten] Frankfurt-M. [printed] Diancta (Diancta) multiplicata Moellendorff [handwritten, underlined] Holotypus Obi-Inseln. Waterstraat S., Rolle H. [handwritten] Sammlung O.v.Moellendorff [printed].
Additional specimens: 3 specimens NMNL: Diancta 3504a multiplicata Mldff. Fruhst. 1004 [handwritten, black frame] / RIJKSMUSEUM NAT. HIST LEIDEN [printed] Diancta multiplicata Mlldff. H.Fruhstorfer 1904 Obi eilanden [handwritten] / NCB Naturalis - Leiden [underlined] Diplommatinidae 40420 Diancta multiplicata Moellendorff RMNH.MOL.156217 [printed] / 2a [handwritten]; 1 specimen NMNL: [upper side of the label] Diancta multiplicata Mlldff. Obi. [underside of the label] Obi Fruhst [both sides handwritten].

References: von Möllendorff (1902: 194); Zilch (1953: 18, pl. 6 fig. 87); van Benthem Jutting (1959: 29, 50); Monk et al. (1997: 395).
Measurements: Holotype H = 6.2 mm, D = 2.5 mm, PD = 2.5 mm.
Description: Shell is large, pale yellow with orange coloured apical whorls, sinistral, elongate, and rather narrowly conical with conical apex. Shell with 6½ slightly convex whorls, the 1½ embryonic whorl is smooth. The suture is rather deeply impressed. The penultimate whorl is large and bulbous. The ultimate whorl is constricted, descending, it is narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is situated on the abapertural side of the shell, it is well defined by a short deep impression. The teleoconch is sculptured with delicate and dense axial ribs. The ribs on the 4th-5th whorls are strongly sinuous and more widely-spaced than on preceding or younger whorls. The ribs are denser and almost straight on both the penultimate and the ultimate whorls. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are 13 ribs per 1 mm, with finely granulate spaces between them and without any indication of spiral striae. The upper and lower sides of the penultimate whorl are more or less parallel in apertural view. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The parietal margin of the peristome is not fully attached to the ultimate whorl. The peristome is double, consists of dense irregularly sinuous lamellae. The inner peristome forms a continuous broad polished callus, its margins are not sinuous. The palatal margin of the outer peristome is slightly sinuous. No specimens were available to study the internal lamellae. Operculum is unknown.
Ecology: Unknown.
Distribution: North Moluccas: Obi Islands. Exact locality is unknown, therefore a distribution map is not given.
Conservation status: Data Deficient, DD. This species is known from series of specimens collected more than 100 years ago and without exact locality data but island name known. This species has not been collected again. Its habitat and threats remain unknown. Further research is required to assess the distribution of this species, its population size, trend and threats.
Remark: Additional specimens from Obi in NMNL (van Benthem Jutting 1959) were not studied.






Diancta (s. str.) ***obiensis*** **sp. nov.** (Fig. 10, plate 20 figs 11-14, map 5)

http://zoobank.org/B7998F97-2A58-47F3-8A0A-D5F36BAD42BC

Holotype UF (No 426418): UF 426418 Mollusca, Diplommatinidae 1-spec. *Palaina sp. 12* Indonesia, Maluku Utara province Obi island, border of garden and rainforest 2.3 km N Woi gardens and rainforest 150 meters -1.7045° 127.6067° John Slacpinsky 26 Oct 2008, JDS-0942 dry FLORIDA MUSEUM OF NATURAL HISTORY [correct name for this locality is Wai].

Paratype 1 specimen UF: UF: 1 specimen UF 426396 Mollusca, Diplommatinidae 1-spec. *Palaina sp. 12* Indonesia, Maluku Utara province Obi island, W shore of Danau Sagu, 8 km NNE of Kawassi burned forest 250 meters -1.5172° 127.4514° John Slacpinsky 23 Oct 2008, JDS-0941 dry FLORIDA MUSEUM OF NATURAL HISTORY [correct name for this locality is Kawasi].

Derivatio nominis: Toponymic. Named after the area of origin, Obi Islands in North Moluccas.

Measurements: Holotype H = 4.6 mm, D = 2.9 mm, HW = 2.3 mm, PD = 2 mm. Paratype: H = 5.1 mm, D = 2.8 mm, HW = 2.3 mm, PD = 2.1 mm.

Description: Shell is large, creamy whitish, sinistral, elongate, and rather broadly conical with conical apex. Shell with 6½ strongly convex whorls, the 1½ embryonic whorl is smooth. The suture is impressed. The penultimate whorl is large and bulbous. The ultimate whorl is constricted, descending, it is distinctly narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is situated on the right side of the shell in holotype, but almost on the abapertural size of the shell - in paratype. On the early and the central whorls the teleoconch is sculptured with rather coarse and very widely-spaced, slightly sinuous axial ribs. The ribs becoming denser on the apertural side of the ultimate whorl, then appearing coarse and very widely-spaced again on the rest of this whorl. There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those of the previous whorls and are oblique to the coiling axis. There are 7-9 ribs per 1 mm, but 10-11 ribs on the apertural side of the ultimate whorl. Spaces between ribs are finely granulate, without indication of spiral striae. The upper and lower side of the penultimate whorl are more or less parallel in apertural view. The aperture is tilted about 15° to the coiling axis and is circular (columellar rim is nearly straight) and has entire apertural rim. In apertural view aperture is strongly shifted left against the coiling axis. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is double, margins are not or slightly sinuous. There is one distinct short transverse palatalis just before the constriction. The columella is broad and shiny. Operculum is unknown.

Differential diagnosis: Very similar to *Diancta torta* O. Boettger, 1891 (North Moluccas), but specifically differs in higher spire, less stronger bulbous penultimate whorl and in presence of single palatalis (four palatalis in *D. torta*).

Ecology: This species inhabits leaf litter of primary and secondary lowland rainforests, as well as gardens.

Distribution: Southernmost North Moluccas: Obi Islands, Obira Island.

Conservation status: Data Deficient, DD. This species is known from 2 localities. Not enough data available to calculate current EOO. The maximum EOO estimated below 5000 km^2 taking into account the area of Obi Islands. The current AOO is 8 km^2. The maximum AOO is likely much higher, but less than 500 km^2. The population size and trend are unknown. Currently there are two locations, but more than 5 locations are estimated when considering the maximum EOO. The main threat is habitat loss and decline in habitat quality caused by logging, mining, conversion of rainforest into gardens, plantations and settlements. The forested part of the maximum EOO has decreased between 2001 and 2014 and more than 14000 ha of rainforest were lost on Obira Island (calculated for canopy density over 25%, according to the Global Forest Watch (2016). Continuing decline in extent and quality of habitat is observed. Considering growing human population, this trend is likely to continue. Further research is required to assess the distribution of this species, its population size, trend and threats.

Diancta (s. str.) ***torta*** **O. Boettger, 1891** (Plate 21 figs 1-5, map 5)

Lectotype SMF: (Diancta) torta n. sp. Insel Batjan. x D? Ad. Strubell 90. [handwritten] / Senckenbg.Mus. [printed] 104908/1 [handwritten] Frankfurt-M. [printed] Diancta (Diancta) torta Boettger [underlined] Lectotypus! T.4 F.6 Insel Batjan A. Strubell 1890 [handwritten] Sammlung O. Boettger [printed].

Paralectotypes3 specimens SMF: Diancta torta Bttg xx Batjian [sic!] [handwritten, label yellow] / Senckenbg. Mus. [printed] 104909/3 [handwritten] Frankfurt-M. [printed] Diancta (Diancta) torta Boettger [underlined] Paratypen Insel Batjan A. Strubell d. [handwritten] Sammlung O.v.Moellendorff [printed].

References: Boettger O. (1891: 288); Smith E.A. (1896: 121), checklist; Kobelt & von Möllendorff (1898: 135), checklist, as *Diancta* subgen. *Eu-*









diancta torta); Kobelt (1902: 420); Zilch (1953: 18, pl. 6 fig. 86); van Benthem Jutting (1959: 29, 50); Monk et al. (1997: 395).

Measurements: Lectotype H = 4.1 mm, D = 2.5 mm, HW = 1.9 mm, PD = 1.7 mm. Selected paralectotypes: H = 3.6 mm, D = 2 mm, HW = 1.8 mm, PD = 1.45 mm; H = 3.4 mm, D = 2.2 mm, HW = 1.7 mm, PD = 1.4 mm.

Description: Shell is large, creamy whitish to pale yellow, sinistral, elongate, and rather broadly conical. Shell with $5^{3}/_{4}$-6¼ strongly convex whorls, the 1½ embryonic whorl is smooth. Shell apex is distinctly convex. The suture is rather deeply impressed. The penultimate whorl is large, strongly bulbous. The ultimate whorl is constricted, descending, it is distinctly narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is situated on the abapertural side of the shell, it is well defined by a short deep impression. The teleoconch is sculptured with coarse widely-spaced, slightly sinuous axial ribs on the earlier and the central whorls. The ribs becoming coarse and very widely-spaced on the last half whorl. There are abrupt changes in the ribbing pattern around the area of constriction - axial ribs becoming much denser here than on the rest of the shell. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are 7 ribs per 1 mm, but 10-11 ribs on the apertural side of the ultimate whorl. Spaces between ribs are finely granulate, without indication of spiral striae. The upper and lower side of the penultimate whorl are more or less parallel in apertural view. The aperture is not tilted to the coiling axis and is circular (but the columellar side is nearly straight) and has entire apertural rim. The aperture is strongly shifted left against the coiling axis in apertural view. The parietal margin of the peristome is not fully attached to the ultimate whorl. The peristome is double. The outer peristome consists of dense irregularly sinuous lamellae in lateral view. The margins of both peristomes are not or slightly sinuous. It is unclear if there is a parietalis (not visible through the shell wall in historical specimens). Four distinct transverse palatalis situated just before the constriction, of which upper one is considerably shorter than three another. The columella is simple and broad. Operculum is unknown.

Ecology: Possibly this species inhabits leaf litter of lowland rainforests.

Distribution: North Moluccas: Bacan Island.

Conservation status: Data Deficient, DD. This species is known from 4 specimens collected more than 100 years ago from one locality and has never been collected again. Further research is required to clarify status of this species in the wild, assess its distribution, population size, trend and highlight threats.

Diplommatina s. l. **Benson, 1849**

Type species: *Bulimus folliculus* L.G.K. Pfeiffer, 1846 (original designation)

Diagnosis: Shell is more or less conical, either dextral or sinistral. The constriction contains teeth, the columellaris is present and usually visible in the aperture. According to Vermeulen & Whitten (1998), the constriction of *Diplommatina* contains two or more longitudinal teeth. The operculum lacks spiral ridges in studied Papuan taxa but often with spiral lines. Based on the presence of the columellaris, Vermeulen (1993) suggested *Diplommatina* may be a monophyletic group. Genetic data supports this assertion (Webster et al. 2012).

Remark: This genus is conchologically aberrant and polymorphic. As a result, numerous attempts have been made to split *Diplommatina* into smaller genera and subgenera (Table 6; next page). The set of conchological characters used to establishing these groups appear polyphyletic with some species sharing many characters and others only a few of them. I generally follow Vermeulen (1993) in my revision and do not use many of the subgenera for *Diplommatina*, except for *Diancta* Martens, 1864 and *Moussonia* O. Semper, 1865 which I consider good genera. Further data from anatomical or molecular studies are needed to test shell characters used to define these groups.

Distribution: This genus has the largest distribution of all Diplommatinidae extending from India in the west to Fiji in the East, from Japan and China in the north to Australia in the South.

Diversity in the study area: Twenty-two species hitherto confirmed (Table 7; next page).



Table 6. Satellite taxa of *Diplommatina* Benson, 1849 other than *Diancta* Martens, 1864 and *Moussonia* O. Semper, 1865 (according to Egorov 2013).

Taxon, author	**Distribution**
Angigaster Pilsbry, Hirase, 1904	Japan: Ryukyu Islands
Benigoma Kuroda, 1928	Japan
Diploptycha von Möllendorff, 1895	The Philippines: Luzon Island
Eclogarinia Iredale, 1933	Australia
Gastroptycha Kobelt et von Möllendorff, 1900	E India (Assam), China, the Philippines, Malaysia, W Indonesia
Metadiancta von Möllendorff, 1898	E India
Sinica von Möllendorff, 1885 (= *Euadnita* Iredale, 1941)	India, China, Indochinese Peninsula, Japan, Papuan Region

Table 7. Characters matrix 3. Genus *Diplommatina* Benson.

Legends: + present; – absent; +/- or 1/2 – character indistinct; ? – unknown; r = axial ribs on the penultimate whorl straight (1) or sinuous (2); rp = ribbing pattern widely-spaced throughout the teleoconch (1), dense (2) or ribbing pattern changing in different parts of the teleoconch (3); ss - spiral striae visible at 80x magnification (+) or not indicated (–); l = axial ribs developed in a form of lamellae (+) or not (-); u = umbilicus open (+) or closed (-);p = Peristome is simple (1) or double (2); pt = number of palatalis; prt = number of parietalis; d = dextral or s = sinistral.

Taxon \ Character	**r**	**rp**	**ss**	**l**	**u**	**p**	**pt**	**prt**	**d / s**
Diplommatina baliana	1	2	+	-	-	2	2	1	d
Diplommatina decollata	1	2	+	-	-	?	?	?	d
Diplommatina floresiana	2	1	-	-	-	2	1	1	s
Diplommatina floris	1	2	-	-	-	2	?	?	d
Diplommatina fluminis	1	1	-	-	-	2	0	1	d
Diplommatina javana	1/2	2	+	-	-	2	0	1	s
Diplommatina jonabletti	1	3	-	-	-	2	1	1	s
Diplommatina leucopsis	1	1	-	-	-	2	?	?	d
Diplommatina lombockensis	1	1	-	-	+/-	2	?	?	s
Diplommatina lucifuga	1	1	+	-	-	2	?	?	d
Diplommatina maibrat	1	2	+	-	-	2	1?	?	s
Diplommatina mertoni	1	2	+	-	-	2	3	1	d
Diplommatina moluccensis	1	2	-	-	-	2	2	0	d
Diplommatina patani	2	2	+	+	-	2	1	1	d
Diplommatina radiiformis	2	2	+	+/-	-	2	1	0	d
Diplommatina slapcinskyi	2	1	+	+		2	1	1	d
Diplommatina smithi	1	2	+	-	-	2	1	?	s
Diplommatina symmetrica	1	1	+	-	-	2	1	1	d
Diplommatina telnovi	2	2	+	-	-	2	3	1	d
Diplommatina timorensis	1	2	+	-	+	1	0	1	d
Diplommatina torquilla	1	1	+	-	-	2	?	?	d
Diplommatina waigeoensis	1/2	2	+	-	-	2	1	1	s

Diplommatina (s. l.) ***baliana*** **Fulton, 1899** (Plate 21 figs 6-9)

Syntypes *D. baliana*, 3 adults BMNH: Diplommatina baliana Fulton Bali Isl. [handwritten] / Prob Syntypes label in Fultons hand - JDA 2016 [handwritten].

Additional material: 2 adults KGC: INDONESIA, Bali Is., Gunung Mesehe mt., 08°17'29.9"S, 114°41'49.4"E, 460 m, 17.III.2011, primary lowland rainforest, soil sample No 2, leg. A.Riedel; 5 adults KGC & 6 adults NME: INDONESIA, Bali Is., Gunung Mesehe mt., 08°17' 40.3"S, 114°41'42.4"E, 515 m, 17.III.2011, primary lowland rainforest, soil sample No 3, leg. A.Riedel; 2 adults KGC & 2 adults NME: INDONESIA, Bali Is., Gunung Mesehe mt., 08°17'46.6"S, 114°41'33.1"E, 490 m, 17.III.2011, primary lowland rainforest, soil sample No 4, leg. A.Riedel; 1 adult KGC: INDONESIA, Bali Is., Gunung Mesehe mt., 08°16'45.4"S, 114°41'72.5"E, 825 m, 18.III.2011, primary lowland rainforest, soil sample No 8, leg. A.Riedel; 1 adult KGC: INDONESIA, Bali Is., Gunung Batukaru mt., 08°21'98"S, 115°05'94.5"E, 945 m, 31.III.2011, primary lowland rainforest, soil sample No 2, leg. A.Riedel; 6 adults KGC & 6 adults NME: INDONESIA, Bali is., Primatani Nature park, Telaga, Busungbiu - Pupuan, 08°17'32.6"S, 114°56'67.1"E, 630 m, 02.IV.2011, primary lowland rainforest, soil sample No 1, leg. A.Riedel; 3 adults KGC: INDONESIA, Bali Is., Primatani Nature park, Telaga, Busungbiu - Pupuan, 08°17'30.4"S, 114°56'63.5"E, 625 m, 02.IV.2011, primary lowland rainforest, soil sample No 2, leg. A.Riedel.






References: Fulton (1899: 213, 216) as *Diplommatina Baliana*; van Benthem Jutting (1928: 154); Rensch B. (1931: 386), as *Diplommatina (Dipl.) baliana*; van Benthem Jutting (1958b: 95); Monk et al. (1997: 395), as *Diplommatina cyclostoma*; Vermeulen & Whitten (1998: 47, 138), proposed synonymy with *D. cyclostoma*; Nurinsiyah & Hausdorf (2017: 222-225), revised status.
Measurements: Selected syntype H = 2.5 mm, D = 1.2 mm, HW = 1.1 mm, PD = 0.8 mm.
Description: Shell is small, whitish or pale orange, dextral, narrow and high conical with convex apex. Shell with 6-6½ convex whorls, the 1½ embryonic whorl is smooth. The suture is rather deeply impressed. The penultimate whorl inconspicuously bulbous, it is slightly wider than the ultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by a short and shallow impression and the suture becoming deeply impressed above the constriction. The constriction is more or less centered in apertural view. The teleoconch is sculptured with dense and rather coarse straight axial ribs. There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those of the previous whorls and are oblique to the coiling axis. There are 12 ribs per 0.5 mm. Spiral striae are delicate and dense. The aperture is tilted about 20° to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The parietal margin of the peristome is not fully attached to the ultimate whorl. The inner peristome forms a broad polished callus on the palatal, basal and columellar sides. The peristome is double, consists of numerous flat sinuous axial lamellae in lateral view. The inner peristome somewhat sinuous at the parietal / palatal junction. The palatal margin of the outer peristome is slightly sinuous at the parietal / palatal junction. There is one parietalis. There is one long longitudinal palatalis positioned opposite the columellar side of the aperture and one transverse palatalis. The columellar denticle distinct, not directed downwards. Operculum is unknown.
Ecology: Specimens inhabit leaf litter and vegetation in primary and secondary lowland to mid-montane rainforests. Observed on both limestone and volcanic soils from lowlands up to 2900 m.
Phylogeny: As a result of COI analysis of specimens from East Java, this species represents same clade with *Diplommatina* species from mainland Asia (e.g. Malay *D. demorgani* Laidlaw, 1949 & Siamese *D. hidagai* Panha, 1997) and Sumatra (*D. canaliculata* von Möllendorff, 1886 & *D. ventricu-lus* von Möllendorff, 1891).
Distribution: Java, Madura; Lesser Sunda Islands: Bali, Sumba. No exact locality is known from Sumba, therefore a distribution map is not given.
Conservation status: Least Concern, LC. The current EOO is about 150000 km^2. The current AOO is about 160 km^2, however the maximum AOO likely be significantly higher. This species inhabits lower to mid montane rainforests in Java and Bali (primarily because of degraded or absent habitat at lower altitudes). No information is available on population size and trend, but on Bali this species is not rare in suitable habitat. The main threat for this species was not identified. This species is widespread compared to most other Diplommatinidae. The population on Java is severely fragmented (Nurinsiyah & Hausdorf 2017), but this is not the case with Bali. Population fragmentation grade is unknown for Sumba and Madura, since the single record is currently known from each of these islands. There are at least five locations. Further research is required to highligh threats for *D. baliana*.

Diplommatina (s. l.) ***decollata*** **van Benthem Jutting, 1958** (Plate 21 figs 10-13, map 13)

Holotype NHMB: Holotypus [handwritten] / Diplommatina St.682 Holotypus decollata [handwritten] / Zoölog. Museum. Amsterdam. [printed] no. 682 Diplommatina decollata (n. sp.) Langgaliru. Zentral Sumba ± 430 m. Höhe 27.ix-14.x.1949 Sumba Exp. 1949 [handwritten] / HOLOTYPUS [printed, label pink, glued on glass] / 6079 a Sumba,Langgaliru [printed].
Paratypes 40 specimens NHMB: 33 adults, 5 juv.: Diplommatina decollata n. sp. [handwritten] / Zoölog. Museum. Amsterdam. [printed] no. 308 Diplommatina decollata n. sp Mau Marru, Ost Sumba ± 520m. Höhe 18-23 Juli 1949 Sumba Expedition 1949 [handwritten] / 5 St. Zool.Mus. Amsterdam [handwritten] / Naturhist. Museum Basel Coll. Dr. Bühler Dr. Sutter 1949 Mau Marru Sumba 308a [printed] / 6079 b Sumba [printed] / PARATYPOIDE [printed, label light green, glued on glass] [correct name for this locality is Mau Maru]; 2 adults: 6079 a Sumba,Langgaliru [printed] / PARATYPOIDE [printed, label light green, glued on glass] / Paratypen [handwritten].

References: van Benthem Jutting, (1958b: 95, pl. 1 fig. 2); Monk et al. (1997: 395).
Measurements (adult shells are decollate): Holotype H = 2 mm, D = 0.9 mm, HW = 0.8 mm, PD = 0.68 mm. Selected paratypic specimens from Mau Maru: H = 2 mm, D = 0.9 mm, HW = 0.8 mm, PD = 0.6 mm; H = 1.8 mm, D = 0.8 mm, PD = 0.57 mm.
Description: Shell is small, corneous, dextral, narrow and high conical. Shell apex is convex in juvenile (non decollate) specimens. Shell with 5-6 slightly






convex whorls (adult shell is decollate). The suture is moderately deeply impressed. The ultimate whorl is constricted, it is strongly narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by a very shallow impression. The constriction is more or less centered in apertural view. The teleoconch is sculptured with delicate dense, straight axial ribs. The ribs becoming somewhat more widely-spaced on the ultimate whorl. There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those of the previous whorls and are oblique to the coiling axis. There are 12-13 ribs per 0.5 mm. Spiral striae are very delicate. The aperture is tilted about 10° to the coiling axis and is circular and has entire apertural rim. The aperture is slightly shifted right against the coiling axis in apertural view. The parietal margin of the peristome is completely attached to the ultimate whorl. The peristome is double, thin and consists of a few close-standing lamellae in lateral view. The margins of the inner peristome are not sinuous. The palatal margin of the outer peristome is sinuous. There is one distinct columellar denticle, not directed downwards. No specimens were available to study the internal lamellae. Operculum is unknown.

Ecology: This species inhabits both primary and secondary lowland rainforests, found both in seasonally dry and year-round wet habitats in leaf litter, on and under decaying wood.

Distribution: Lesser Sunda Islands: Sumba Island.

Conservation status: Data Deficient, DD. This species is currently known from three localities. The current EOO is 43 km^2. The maximum EOO estimated about 10000 km^2 taking into account the area of Sumba Island and forested area. The current AOO is 12 km^2, but the maximum AOO is likely higher, but definitively below the threshold of 500 km^2. This species inhabits both primary and secondary rainforests under various soil humidity conditions (year-round wet and seasonally dry). Threats for this species are not fully understood. Habitat loss considered the main threat, but since *D. decollata* also reported from degraded forests, the importance of this threat remains to be clarified. Population fragmentation grade is not clear. There are at least two locations. Further research is required to clarify status of this species in the wild, assess its distribution, population size, trend and highlight threats.

Diplommatina (s. l.) ***floresiana*** **E.A. Smith, 1897**

(Fig. 112, plate 22 figs 1-7, map 12)

Lectotype BMNH [herewith designated]: Diplom. Floresiana Sm. S. Flores. 4000 ft. 97.8.3.75-4 [handwritten] / Floresiana,Smith I.Flores [handwritten].

Additional material: 4 adults KGC: INDONESIA, Nusa Tenggara, Flores Is., Ranamese Lake, 08°37.024'S, 120°33'40"E, 1270 m, 08.III.2011, primary lower montane rainforest, soil sample No 3, leg. A.Riedel; 3 adults KGC: INDONESIA, Nusa Tenggara, Flores Is., Gn. Ranaka mt., 08°38.099'S, 120°31.745'E, 2205 m, 09.III.2011, primary mid montane rainforest, soil sample No 3, leg. A.Riedel.

Note: *D. floresiana* was described from 5 specimens (3 adults & 2 juv.). In the description, Smith E.A. (1897a: 626) described axial ribbing pattern as "oblique tenuiter costellata" but has not specified how dense the axial ribs are. Later, in the same description Smith pointed on "variability" of the aforementioned character: "In one specimen the riblets near the constriction of the body-whorl are much closer together than those upon the rest of the shell". In fact, of three adult shells two have denser ribs on the ultimate whorl above the aperture. The type series of *D. floresiana* consists of two distinct but conchologically similar species. The true *D. floresiana* is presented only by the lectotype I herewith designate. Two other adult shells with denser ribbed ultimate whorl are herewith designated as paralectotypes and described below as *D. jonabletti* sp. nov. Both species share same habitat on Flores Island and are also represented in recently collected material. It is impossible to properly identify and assign to species the two juv. paralectotypes [herewith designated] of *D. floresiana*'s type series. The ultimate whorl and the constriction are not developed in these specimens and important diagnostic characters are therefore not present. These two shells are supplemented with a label "*Diplommatina* sp. det. K.Greķe, 2016".

References: Smith E.A. (1897a: 626); Kobelt & von Möllendorff (1898: 139), checklist, as *Diplommatina* subgen. *Pseudopalaina floresiana*; Rensch B. (1931: 389), as *Diplommatina (Pseudopalaina) floresiana*; Kobelt (1902: 452), as *Diplommatina (P.[seudopalaina]) floresiana*; Rensch B. (1931: 389), as *Diplommatina (Pseudopalaina) floresiana*.

Measurements: Holotype H = 3 mm, D = 1.75 mm, HW = 1.6 mm, PD = 1.3 mm. Selected specimens from Lake Ranamese env.: H = 3 mm, D = 1.8 mm, HW = 1.6 mm, PD = 1.25 mm; H = 2.9 mm, D = 1.6 mm, HW = 1.6 mm, PD = 1.25 mm. Selected specimens from Ranaka mt.: H = 2.85 mm, D = 1.65 mm, HW = 1.5 mm, PD = 1.2 mm; H = 2.9






mm, D = 1.8 mm, HW = 1.6 mm, PD = 1.3 mm.

Description: Shell is small, corneous to pale reddish, sinistral, obese with convex apex. Shell with 6 convex whorls, the 1½ embryonic whorl is microstriate. The suture is rather deeply impressed. The ultimate whorl is nearly as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by a very shallow impression and minor changes in ribbing pattern (few of the ribs are placed denser at the constriction). The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse, widely-spaced, slightly sinuous to almost straight axial ribs. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are slightly oblique to the coiling axis. There are about 6-7 ribs per 1 mm, but they become somewhat more widely-spaced on the apertural side of the ultimate whorl. Spiral striae are lacking. The aperture is slightly tilted to the coiling axis, subquadrate and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is double, with obtuse angulations on the palatal and columellar sides. The palatal and basal margins of both tperistomes are sinuous. Both the inner and the outer peristomes reflexed on the palatal (strongly), basal and columellar sides. There is one acute parietalis. There is one short longitudinal palatalis situated above the columellar side of the aperture. There is one distinct narrow columellar denticle directed downwards in fully grown specimens (but also can be more or less strongly reduced). The operculum is primitive - circular and without concentric ridges.

Ecology: Specimens inhabit wet leaf litter and the underside of decaying wood. This species occurs in primary lower to mid montane rainforests and was reported from altitudes of 1200-2205 m. Both recent and historical material comes from areas on volcanic soils.

Distribution: Lesser Sunda Islands: Flores Island. Record from southern Sulawesi (Rensch B. 1931), almost certainly based on misidentified specimen, was not included into the checklist of Sulawesi terrestrial molluscs (Maassen 1997) and needs further confirmation.

Conservation status: Near Threatened, NT. The current EOO is around 1000 km^2. The maximum EOO estimated about 15000 km^2 taking into account the area of Flores Island (13540 km^2) and adjacent islands. The current AOO is about 12 km^2, however the maximum AOO likely be much higher since this species is underresearched, but definitively below 500 km^2. No information is available on population size or population trends, but in certain areas *Diplommatina floresiana* is not uncommon. This species inhabits moist litter of lower to mid montane rainforests and is not found in arid and deforested lowlands. The population is not severely fragmented, but fragmentation is likely to increase. Main threats for this species are Habitat loss and alteration due conversion of the rainforests into gardens as well as timber collecting and small-scale logging. Growing human population on Flores combined with more frequent and longer dry periods caused by global warming and El Niño weather patterns will likely have continued negative effect on the remaining natural rainforests of Flores. Between 2001 and 2014, Flores, its adjacent islands of Lembata, Adonara, Solor and Rinca lost almost 29000 ha of primarily lowland forest (calculated for canopy density over 25% according to the Global Forest Watch (2016). Human population is not spreading significantly from the lowlands to the montane areas, but wet mountains are primarily threatened by expanding small-scale gardens and logging for construction purposes. These trends are likely to cause a continuing decline in the AOO and extent of the habitat. Currently there are three locations for *D. floresiana*. The human population is not encroaching on the habitat yet, but a continuing decline in the near future is projected based on the known trend of forest loss because of human activities and climate change. Further research is required to assess the distribution of this species, its population size, trend and threats.

Diplommatina (s. l.) ***floris*** **B. Rensch, 1931** (Fig. 13, plate 23 figs 1-6, map 12)

Holotype MHUB: Sunda-Expedition Rensch Fundort: [printed] Waë Renó (1000 m) W. Flores [handwritten] Datum: [printed] 25.6.27 [handwritten] No: [printed] / Zoolog. Museum Berlin [printed] Diplommatina (Sinica) floris Rensch * Waë Reno, W. Flores 1000m 75429 Rensch [handwritten] / Zoolog. Museum Berlin. Typus von: [printed] Diplommatina (Sinica) floris Rensch Zool. Jahrb. Syst., 61, p. 387, Fig. 12, 1931 [handwritten] [label red].

Paratypes 3 adults MHUB: Sunda-Expedition Rensch Fundort: [printed] Waë Renó (1000 m) W. Flores [handwritten] Datum: [printed] 25.6.27 [handwritten] No: [printed] / Dipl. (Sinica) floris Paratypen. Rensch [handwritten] / Zoolog. Museum Berlin [printed] Diplommatina (Sinica) floris Rensch Waë Renó, W.Flores 1000m 75430 Rensch [handwritten].






References: Rensch B. (1931: 387), as *Diplommatina (Sinica) floris*.
Measurements (adult shells are decollated): Holotype H = 2.1 mm, D = 1.05 mm, HW = 1 mm, PD = 0.7 mm. Selected paratype H = 2.1 mm, D = 1 mm, PD = 0.8 mm.
Description: Shell is small, white, dextral, narrow fusiform. Shell with 5½ convex whorls (adult shell is decollated), number of embryonic whorls is unknown. The suture is moderately deeply impressed. The ultimate whorl is about as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by a very shallow impression. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse, dense, straight axial ribs. There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those of the previous whorls and are straight to the coiling axis. There are about 23-25 ribs per 0.5 mm. Spiral striae not visible at 80x magnification, but is present according to the original description. The aperture is not tilted to the coiling axis and is circular has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is double, thin in lateral view. The inner peristome forms a continuous polished callus. Peristomal margins are not sinuous. One distinct broad columellar denticle, not directed downwards. No specimens were available to study the internal lamellae of the shell, but one transverse palatalis is visible through the shell wall. The columella is obliquely twisted, forming an oblique median columellaris. Operculum is unknown.
Ecology: According to the original description, this species occurs in leaf litter of primary [montane] rainforests.
Distribution: Lesser Sunda Islands: Flores Island.
Conservation status: Data Deficient, DD. Currently not enough data available to calculate current EOO and AOO. The maximum EOO for this species estimated 9000 km^2 taking into account the area of Flores and present distribution of mid montane rainforests on this island. This species is known from a series of specimens collected from one locality over 80 years ago and has not been collected again. The population size and trend are unknown. The main threat to this species is likely to be habitat alteration alteration. Between 2001 and 2014, Flores has lost over 17000 ha of the rainforest (calculated for canopy density over 25% according to the Global Forest Watch (2016)), primarily in lowland forests. Further research is required to assess the distribution of this species, its population size, trend and threats.

Diplommatina (s. l.) ***fluminis* B. Rensch, 1931** (Fig. 11, plate 23 figs 7-13, map 12)

Holotype MHUB: was not available for this study.
Paratypes 13 adults MHUB: Sunda-Expedition Rensch Fundort: [printed] Waingapoe, Sumba Kambera-Genist [handwritten] Datum: [printed] 27.7.27 [handwritten] No: [printed] / Zoolog. Museum Berlin [printed, underlined] Diplommatina (Sinica ?) fluminis Paratypen! Rensch Waingapoe, Sumba KamberaGenist 75437 Rensch [handwritten].
Additional material 2 adults MHUB: Zoolog. Museum Berlin [printed, underlined] 79579 Diplommatina fluminis B. Rensch Genist bei Noilmina W. Timor lg. Stein 1.II.32 [handwritten].

References: Rensch B. (1931: 388), as *Diplommatina (Sinica ?) fluminis*; Rensch (1933: 496), as *Diplommatina (Sinica ?) fluminis*; Rensch B. (1935: 312, 314); Forcart (1936: 138), as *Diplommatina (Sinica) fluminis*; van Benthem Jutting (1958b: 95); Monk et al. (1997: 395); Vermeulen & Whitten (1998: 49, 138).
Measurements: Five selected paratypes (all adult shells are decollated): H = 1.7 mm, D = 0.9 mm, PD = 0.6 mm; H = 1.7 mm, D = 0.9 mm, PD = 0.6 mm; H = 1.9 mm, D = 0.9 mm, PD = 0.6 mm; H = 1.7 mm, D = 0.8 mm, PD = 0.55 mm; H = 1.85 mm, D = 0.9 mm, PD = 0.6 mm;
Description: Shell is very small, white, slightly translucent, dextral, narrow fusiform. Shell with 5½ strongly convex whorls, number of embryonic whorls is unknown. The suture is deeply impressed. The penultimate whorl is bulbous. The ultimate whorl is constricted and ascending, it is narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by a short and shallow impression. The constriction is situated beyond the aperture in apertural view. The teleoconch is sculptured with coarse, very widely-spaced, straight or slightly sinuous axial ribs. There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those of the previous whorls and are straight to the coiling axis. There are about 5 ribs per 0.5 mm. The ribs becoming twice denser on the apertural side of the ultimate whorl. Spiral striae are not visible at 80x magnification, but is present according to the original description. The aperture is slightly tilted to the coiling axis and is circular and has entire apertural rim. The aperture is slightly shifted right against the coiling axis in apertural view. The






parietal margin of the peristome is attached to the ultimate whorl. The peristome is double, thin in lateral view. The inner peristome forms a continuous narrow polished callus. Margins of both peristomes are not sinuous. There is one parietalis. The columella is thin, obliquely twisted, forming an oblique columellaris in its basal third. One distinct broad columellar denticle, not directed downwards. Columellar denticle is double in certain paratypes (see Plate 23 fig. 13). Operculum is unknown.

Ecology: This species inhabits both primary and secondary lowland rainforests and was found in leaf litter and under decaying wood in both seasonally dry and year-round wet habitats, as well as in riverside debris. It is also reported from agricultural land (Vermeulen & Whitten 1998). It occurs from sea level up to 800 m and prefers limestone soils.

Distribution: Bali, Nusa Penida. Lesser Sunda Islands: Flores Island, Sumba Island, western part of Timor Island.

Conservation status: Data Deficient, DD. The current EOO is about 100000 km^2. The current AOO is about 28 km^2, but the maximum AOO is likely much higher. The maximum EOO for this species estimated about 150000 km^2 considering its large distribution area. This species seems not rare, but the population size and trend are unknown. The main threat cannot be identified (especially considering the fact that *D. fluminis* is also found in secondary rainforest and in agricultural land). Further research is required to assess the distribution of this species, its population size, trend and threats.

Note: It is likely specimens from Bali and Nusa Penida belong to different, yet undescribed species since columellar denticle is less prominent and smaller in these specimens and their shells are less slender than in specimens from Lesser Sunda Islands.

Diplommatina (s. l.) ***javana* von Möllendorff, 1897**

(Fig. 12, plate 23 figs 14-18, map 13)

= *Diplommatina javana orientalis* B. Rensch, 1931 (Plate 23 figs 14-18)

Holotype *Diplommatina javana orientalis* MHUB: Sunda-Expedition Rensch Fundort: [printed] Geli Moetoe (1300 m) Flores [handwritten] Datum: [printed] 21.7.27 [handwritten] No: [printed] / Zoolog. Museum Berlin [printed] Diplommatina (Sinica) javana orientalis Rensch * Geli Moetoe W. Flores 1300m. 75431 Rensch [handwritten] / Zoolog. Museum Berlin. Typus von: [printed] Diplommatina (Sinica) javana orientalis Rensch Zool. Jahrb. Syst., 61, p. 387, 1931 [handwritten] [label red].

Paratypes *Diplommatina javana orientalis*: 3 adults MHUB: Sunda-Expedition Rensch Fundort: [printed] Waë Renó (1000 m) W. Flores [handwritten] Datum: [printed] 25.6.27 [handwritten] No: [printed] / Dipl. (Sinica) floris Paratypen. Rensch [handwritten] / Zoolog. Museum Berlin [printed] Diplommatina (Sinica) floris Rensch Waë Renó, W.Flores 1000m 75430 Rensch [handwritten]; 3 adults, 1 juv. MHUB: Sunda-Expedition Rensch Fundort: [printed] Geli Moetoe (1300 m) Flores [handwritten] Datum: [printed] 21.7.27 [handwritten] No: [printed] / Zoolog. Museum Berlin [printed] Paratypen! Diplommatina (Sinica) javana orientalis Rensch * Geli Moetoe 1300m Flores 21.7.27 75432. Rensch [handwritten]; 3 adults MHUB: Sunda-Expedition Rensch Fundort: [printed] Batoeriti (800m), Bali [handwritten] Datum: [printed] 3.-4.8.27 [handwritten] No: [printed] / Zoolog. Museum Berlin [printed] Diplommatina (Sinica) javana orientalis Rensch Batoeriti Bali 800 m 75433 Rensch [handwritten] [red circular label on the box].

Additional material 1 adult KGC: INDONESIA, Bali Is., Tamblingan, 08°15'10.8"S, 115°05'57.3"E, 1350 m, 03.IV.2011, primary lower montane rainforest, soil sample No 5, leg. A.Riedel.

References: Rensch B. (1931: 387), as *Diplommatina (Sinica) javana orientalis*; van Benthem Jutting (1948: 599-600), as *Diplommatina (Sinica) javana orientalis*; Vermeulen & Whitten (1998: 50, 138), new synonymy; Nurinsiyah & Hausdorf (2017: 211).

Measurements: Holotype *Diplommatina javana orientalis* H = 3.05 mm, D = 1.7 mm, HW = 1.45 mm, PD = 1.15 mm. Selected paratypes from Geli Moetoe: H = 2.9 mm, D = 1.6 mm, PD = 1.2 mm; H = 2.25 mm, D = 1.5 mm, PD = 1.2 mm.

Description: Shell is small, white to orange, sinistral, broadly conical with convex apex. Shell with 5½-5¾ convex whorls (according to Vermeulen & Whitten 1998 there are 4⅛-5¼ whorls in this species), the 1½ embryonic whorl is smooth. The suture is moderately deeply impressed. The ultimate whorl is narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well defined by a short and shallow impression and denser and stronger sinuous ribbing pattern. The constriction is more or less centered in apertural view. The teleoconch is sculptured with fine, dense, slightly sinuous axial ribs. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are about 19-20 ribs per 1 mm. Spiral striae very delicate, present on all whorls (holotype *Diplommatina javana orientalis*), or only on early whorls (paratypes *D. javana orientalis* and specimens from Bali). The aperture is not or barely tilted to the coiling axis, circular and has entire or parietally discontinued apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The









parietal margin of the peristome is attached to the ultimate whorl. The peristome is double, broad in lateral view and consists of several distant lamellae. The inner peristome forms a continuous broad polished callus. The palatal margins of both peristomes are sinuous. In certain specimens the parietal side of the aperture expands up to the upper suture. There is one short parietalis. The columella is strongly obliquely twisted, forming a strong horizontal columellaris in its basal third. One distinct broad columellar denticle is directed downwards in specimens from Bali and Java, being smaller and not directed downwards in Flores specimens. Operculum is unknown.

Ecology: Specimens inhabit leaf litter, soil and lower vegetation in primary and secondary lowland to mid montane rainforests. It is observed on volcanic soils from lowlands up to 2700 m.

Distribution: Java, Bali; Lesser Sunda Islands: Flores Island.

Conservation status: Least Concern, LC. The current EOO is about 81000 km^2. The current AOO is about 40 km^2, however the maximum AOO is likely much higher. This species inhabits lowland to mid montane rainforests (possible because of habitat being degraded or unavailable at lower altitudes). No information is available on the population size and trend, but on Bali and Java this species is not uncommon. The main threat for this species is habitat alteration and decline in AOO. Since this species also known to occur in secondary and degraded rainforests, the population considered stable. The population on Java is severely fragmented (*D. javana* occurs in montane areas of Java with large gaps in-between (Nurinsiyah & Hausdorf 2017)), but not on Bali. Population fragmentation grade is unknown for Flores, since single historical locality is known from here. There are no less than five locations. Further research is required to assess the distribution of this species, its population size, trend and threats.

Diplommatina (s. l.) ***jonabletti* sp. nov.** (Figs 14 & 113, plate 22 figs 8-17, map 13)

http://zoobank.org/94BE653B-0162-4FB6-B8F5-5F531DF30E19

Holotype BMNH: INDONESIA, Nusa Tenggara, Flores Is., Gn. Ranaka mt., 08°38.099'S, 120°31.745'E, 2205 m, 09.III.2011, primary mid montane rainforest, soil sample No 3, leg. A.Riedel.

Paratypes 22 specimens: 4 adults & 1 subadult KGC: same label as holotype; 2 adults BMNH [syntypes of *D. floresiana* E.A. Smith, 1897]: Diplom. Floresiana Sm. S. Flores. 4000 ft. 97.8.3.75-4 [handwritten] / Floresiana,Smith I.Flores [handwritten] / PARALECTOTYPE [printed, label red, black frame] / Diplommatina jonabletti sp. nov. det. K.Greķe, 2016 [printed]; 1 adult & 1 subadult NME: INDONESIA, Nusa Tenggara, Flores Is., Gn. Ranaka mt., 08°37'32.1"S, 120°31'46.3"E, 1535 m, 08.III.2011, primary lower montane rainforest, soil sample No 1, leg. A.Riedel; 1 subadult NME: INDONESIA, Nusa Tenggara, Flores Is., Gn. Ranaka mt., 08°38.277'S, 120°31.616'E, 2010 m, 10.III.2011, primary mid montane rainforest, soil sample No 5, leg. A.Riedel; 1 adult KGC: INDONESIA, Nusa Tenggara, Flores Is., Gn. Ranaka mt., 08°37.714'S, 120°31.509'E, 1850 m, 10.III.2011, primary mid montane rainforest, soil sample No 7, leg. A.Riedel; 1 adult & 1 subadult KGC: INDONESIA, Nusa Tenggara, Flores Is., Gn. Ranaka mt., 08°37'71.4"S, 120°31'50.9"E, 1850 m, 10.III.2011, primary mid montane rainforest, soil sample No 7B, leg. A.Riedel; 3 adults & 1 subadult NME, 2 adults KGC: INDONESIA, Nusa Tenggara, Flores Is., Gn. Ranaka mt., 08°37'48.1"S, 120°31'41"E, 1610 m, 10.III.2011, primary lower montane rainforest, soil sample No 10, leg. A.Riedel; 3 adults KGC: INDONESIA, Nusa Tenggara, Flores Is., Gn. Ranaka mt., 08°37'38.6"S, 120°31'15.6"E, 1575 m, 10.III.2011, primary lower montane rainforest, soil sample No 11, leg. A.Riedel.

Consider note by *D. floresiana* E.A. Smith, 1897.

Measurements: Holotype H = 2.7 mm, D = 1.65 mm, HW = 1.5 mm, PD = 1.2 mm. Selected paratypes from locus typicus: H = 2.85 mm, D = 1.7 mm, HW = 1.65 mm, PD = 1.25 mm; H = 2.8 mm, D = 1.65 mm, HW = 1.5 mm, PD = 1.2 mm; H = 2.85 mm, D = 1.7 mm, HW = 1.5 mm, PD = 1.2 mm. Paralectotypes of "*Diplommatina floresiana*" from southern Flores: H = 3.35 mm, D = 1.9 mm, HW = 1.9 mm, PD = 1.35 mm; H = 3.2 mm, D = 1.9 mm, HW = 1.7 mm, PD = 1.3 mm.

Description: Shell small, pale brown, sinistral, and broadly conical with a convex apex. Shell with 6 convex whorls, the 1¼-1½ embryonic whorl is microstriate. The suture is rather deeply impressed. The ultimate whorl is about as wide as the penultimate whorl in apertural view. The umbilicus is closed in adults. The constriction is poorly defined by a short and shallow impression and a short zone of denser placed axial ribs. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse, widely spaced ribs on early whorls but becomes dense on apertural side of the ultimate whorl. The axial ribs are slightly sinuous to nearly straight abruptly becoming denser around the constriction. The ribs are not synchronized with those on previous whorls and are straight or slightly oblique to the coiling axis. There are about 6-7 ribs per 1 mm on the penultimate whorl, becoming 2-3 times denser on the apertural surface of the ultimate whorl. The circular aperture is not or






is barely tilted against the coiling axis, and the peristome edges are connected or discontinued on the parietal side. The position of the aperture is more or less central against the coiling axis. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is double, provided with an obtuse angulation at palatal / parietal junction. The palatal and basal margins of both peristomes are sinuous. The palatal and basal margins of the outer peristome are reflexed. There is one short acute parietalis and one short transverse palatalis that is close to the upper margin of the last whorl (position of this tooth is almost central with regard to the parietal side of the peristome). One distinct narrow columellar denticle is directed downwards in fully grown specimens. The columella is shiny and thin, obliquely twisted and forming an acute oblique columellaris in its basal third. The operculum is translucent, irregularly circular and thin. Its corneous plate bears concentric lines.

Differential diagnosis: This species is similar to *Diplommatina floresiana* E.A. Smith, 1897 (Flores Island), but distinct in having a transverse palatalis whereas *D. floresiana* has a longitudinal palatalis. In addition *D. jonabletti* sp. nov. has denser axial ribs on the apertural side of the ultimate whorl. *D. javana* von Möllendorff, 1897 (islands of Bali, Flores, Java) is also similar, but differs in having a peristome with rounded margins that lacks angulations. *D. javana* also lacks a transverse palatalis in the upper part of the ultimate whorl that is present in *D. jonabletti* sp. nov.

Ecology: Specimens inhabit wet leaf litter and the underside of decaying wood in primary lower to mid montane rainforests, from altitudes of 1200-2205 m. Both recent and historical material comes from areas on volcanic soils.

Distribution: Lesser Sunda Islands: Flores Island.

Conservation status: Endangered, EN B2ab(ii,iii). The current EOO is around 50 km^2. The maximum EOO estimated is about 15000 km^2 taking into account the area of Flores Island (13540 km^2) and adjacent islands. The current AOO is about 16 km^2, however the AOO could be much higher since the species is undersampled, but the AOO is definitively below 500 km^2. No information is available on population size or population trends, but *Diplommatina jonabletti* sp. nov. seems rather common on Mt. Ranaka. This species inhabits moist litter of lower to mid montane rainforests, and is not found in arid and deforested lowlands. The population is not severely fragmented, but fragmentation is likely to increase. Main threats for this species are Habitat loss and alteration due conversion of the rainforests into gardens as well as timber collecting and small-scale logging. Growing human population on Flores combined with more frequent and longer dry periods caused by global warming and El Niño weather patterns will likely have continued negative effect on the remaining natural rainforests of Flores. Between 2001 and 2014, Flores, its adjacent islands of Lembata, Adonara, Solor and Rinca lost almost 29000 ha of rainforest cover in the lowlands (Global Forest Watch 2016). Human population is not spreading significantly from the lowlands to the montane areas, but wet mountains are primarily threatened by expanding small-scale gardens and logging for construction purposes. These trends are likely to cause a continuing decline in the AOO and extent of the habitat. There are three known locations for *D. jonabletti* sp. nov. The human population is not encroaching on the habitat yet, but a continuing decline in the near future is projected based on the known trend of forest loss because of human activities and climate change. Additional research is required to determine its distribution, population size and population trends. The species is assessed as EN since AOO is between 16-500 km^2, and it is known from three locations.

Diplommatina (s. l.) ***leucopsis* van Benthem Jutting, 1958** (Plate 24 figs 1-7, map 14)

Holotype NHMB: HOLOTYPUS [printed, label pink, glued on glass] / 6082 a Sumba,Baing [printed].

Additional material: 2 adults, 1 juv. NHMB: Sunda-Expedition Rensch Fundort: [printed] Waingapoe, Sumba Kambera-Genist [handwritten] Datum: [printed] 27.7.27 [handwritten] No: [printed] / Zoolog. Museum Berlin [printed] Diplommatina (Sinica ?) fluminis Paratypen! Rensch Waingapoe, Sumba KamberaGenist 75437 Rensch [handwritten] / Diplommatina leucopsis van Benthem Jutting, 1958 det. K.Greķe, 2016 [printed] [these specimens were found among paratypes of *Diplommatina fluminis*].

References: van Benthem Jutting (1958b: 97-98, pl. 1 fig. 5); Monk et al. (1997: 395).

Measurements: Holotype H = 2.6 mm (adult shell is decollate), D = 1.6 mm, HW = 1.1 mm, PD = 1 mm. Selected adult specimens from type locality: H = 2.1 mm (adult shell is decollate), D = 1.3 mm, PD = 0.7 mm, H = 1.8 mm (adult shell is decollated), D = 0.9 mm, PD = 0.6 mm.

Description: Shell is very small, white to corneous, dextral, fusiform. Shell apex is convex in juvenile specimens. Shell with 6 strongly convex whorls (adult shell is decollate), there is 1 embryonic whorl. The suture is deeply impressed. The penultimate






whorl is bulbous. The ultimate whorl is constricted, much narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well defined by a distinct short impression. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse, widely-spaced, straight axial ribs. There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those of the previous whorls and are straight to the coiling axis. There are about 10 ribs per 1 mm. The ribs are more widely-spaced on early whorls. Spiral striae are not visible at 80x magnification but is present according to the original description. The aperture is tilted about 10° against to the coiling axis and is circular and has entire apertural rim. The aperture is shifted right against the coiling axis in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. A continuous callus is developed on the palatal, basal and columellar sides of the aperture. The peristome is double, consists of delicate close-standing lamellae in lateral view. Peristomal margins are not sinuous. One distinct columellar denticle, not directed downwards. No specimens were available to study the internal lamellae. The operculum is primitive - circular and translucent.

Ecology: According to the original description, this species occurs in wet rainforest leaf litter.

Distribution: Lesser Sunda Islands: Sumba Island.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. The maximum EOO for this species is about 11000 km^2 taking into account the area of Sumba. This species is known from 3 specimens collected from two localities about 60 years ago and has not been collected again. The population size and trend are unknown. Between 2001 and 2014 Sumba has lost almost 10000 ha of the rainforest (calculated for canopy density over 25% according to the Global Forest Watch (2016)). Further research is required to clarify status of this species in the wild, assess its distribution, population size, trend and highlight threats.

Diplommatina (s. l.) ***lombockensis*** **E.A. Smith, 1898** (Plate 23 figs 19-22)

Syntypes 5 adults BMNH: Diplommatina Lombockensis, Smith 1898, Type. Lombock [sic!] (W.Doherty) 98.7.20.1-5 [handwritten] / Lombockensis, Smith. Lombock I. [handwritten] / Type. [printed].

References: Smith E.A. (1898: 31, pl. 2 fig. 18), as *Diplommatina Lombockensis*; Kobelt & von Möllendorff (1898: 137), checklist, as *Diplommatina* Subgen. *Eudiplommatina* Kob. et Mlldff. *lombokensis* [sic!]; Rensch B. (1931: 389), as *Diplommatina (Pseudopalaina) lombockensis*.

Measurements: Selected syntype H = 3.3 mm, D = 1.9 mm, HW = 1.7 mm, PD = 1.4 mm.

Description: Shell is small, white with upper half pale orange, sinistral, broadly conical with convex apex. Shell with 6 convex whorls, the 1½ embryonic whorl is microgranulate. The suture is deeply impressed. The ultimate whorl is as wide as the penultimate whorl in apertural view. The umbilicus is very narrowly open. The constriction is poorly defined by a short shallow impression and suture becoming deeper above the constriction. The constriction is more or less centered in apertural view. The teleoconch is sculptured with very coarse widely-spaced straight axial ribs. There are no abrupt changes in the ribbing pattern. The ribs are synchronized with those of the previous whorls. The ribs range from straight to slightly oblique with regard to the coiling axis. In fully grown specimens ribs becoming much higher (lamella-like) near the suture. There are about 5 ribs per 1 mm, the ribs becoming somewhat denser on the apertural side of the ultimate whorl. Spiral striae are not visible at 80x magnification. The aperture is tilted about 10-20° to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, thin in lateral view. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a continuous polished callus. The margins of the inner peristome are not sinuous. The margin of the outer peristome is expanding beyond the inner one. The palatal margin of the outer peristome is slightly sinuous, the basal margin is reflexed. One inconspicuous columellar denticle, not directed downwards. No specimens were available to study the internal lamellae. Operculum is unknown.

Ecology: Unknown.

Distribution: Lesser Sunda Islands: Lombok Island. Exact locality is unknown, therefore a distribution map is not given.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. This species is known from the type series sampled from single locality about 100 years ago and has not been collected again. The population size, trend and threats remain unknown for *D. lombockensis*. Further research is required to clarify status of this species in the wild, assess its distribution, population size, trend and highlight threats.






Diplommatina (s. l.) ***lucifuga*** **van Benthem Jutting, 1958** (Plate 24 figs 8-13, map 14)

Holotype NHMB: Holotypus [handwritten] / Diplommatina Stal. 575 Holotypus lucifuga [handwritten] / 6080 a Sumba,Waikarudi [printed] / HOLOTYPUS [printed, label pink, glued on glass].

Paratypes 3 adults & 1 subadult NHMB: Paratypen [handwritten] / 1 St. Zool. Mus. Amsterdam [handwritten] / Diplommatina lucifuga n.sp. Paratypen [handwritten] / Naturhist. Museum Basel Coll. Dr. Bühler Dr. Sutter 1949 Waikarudi Sumba 575 [printed] / 6080 a Sumba,Waikarudi [printed] / PARATYPOIDE [printed, label light green, glued on glass].

References: van Benthem Jutting (1958b: 96, pl. 1 fig. 3); Monk et al. (1997: 395).

Measurements (all adult shells are decollate): Holotype H = 2.5 mm, D = 1.3 mm, HW = 1 mm, PD = 0.83 mm. Two selected adult paratypes: H = 2.4 mm, D = 1.2 mm, PD = 0.8 mm; H = 2.35 mm, D = 1.25 mm, PD = 0.8 mm

Description: Shell is very small, white, dextral, narrow fusiform. Shell with 6 strongly convex whorls (adult shell is decollate), number of embryonic whorls is unknown. The suture is deeply impressed. The penultimate whorl is bulbous. The ultimate whorl is strongly constricted, it is much narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is very poorly defined. The constriction is situated beyond the aperture in apertural view. The teleoconch is sculptured with very coarse, widely-spaced, straight axial ribs. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are straight to the coiling axis. There are about 5 ribs per 0.5 mm, the ribs becoming twice denser on the apertural side of the ultimate whorl. Spiral striae are distinct and dense. The aperture is tilted about 10° to the coiling axis, it is circular and has entire apertural rim. The parietal margin of the peristome is attached to the ultimate whorl. The aperture is shifted right against the coiling axis in apertural view. The peristome is double, thin in lateral view. The inner peristome forms a continuous polished callus. The palatal margins of both peristomes are hardly sinuous. One small columellar denticle, not directed downwards. No specimens were available to study the internal lamellae. Operculum is unknown.

Ecology: According to the original description, this species occurs on the ground under decaying wood of wet Areca and Coconut palms stands.

Distribution: Lesser Sunda Islands: Sumba Island.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. This species is known from five specimens sampled from single locality about 70 years ago and has not been collected again. The population size, trend and threats are unknown. Further research is required to clarify status of this species in the wild, assess its distribution, population size, trend and highlight threats.

Diplommatina (s. l.) ***maibrat*** **sp. nov.** (Plate 24 figs 14-17, map 22)

http://zoobank.org/4E18F415-BF64-4018-A43E-625514E930DC

Holotype NME: INDONESIA E, W New Guinea, Doberai Peninsula, Ayamaru vill. 23 km SE, Aqafu springs, 1°23'15S, 132°22'04"E, ~330-340 m, 04.IX.2015, primary lowland rainforest on limestone, near the springs, leg. D.Telnov.

Derivatio nominis: Named after Maibrat, local tribe and language of central part of Doberai Peninsula lowlands, the area where this species was first collected. Noun in apposition, invariable.

Measurements: Holotype H = 2.3 mm, D = 1.5 mm, HW = 1.6 mm, PD = 1.1 mm.

Description: Shell is small, yellow, sinistral, conical with pointed apex. Shell with 6 convex whorls, the 1¼ embryonic whorl is smooth. The suture is rather deeply impressed. The ultimate whorl is constricted, somewhat wider than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is not defined on shell wall. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse, dense, straight axial ribs. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are slightly oblique to the coiling axis. There are 6 ribs per 0.5 mm. Spiral striae are very delicate, dense. The aperture is tilted about 10-15° to the coiling axis and is circular and has entire apertural rim. The position of the aperture is more or less central below the coiling axis. The parietal margin of the peristome is attached to the ultimate whorl in apertural view. The peristome is double, thin in lateral view. The inner peristome forms a continuous polished callus. The outer peristome with margins expanding and protruding on the palatal, basal and columellar sides (last one is less distinct). Both the palatal and basal margins of the outer peristome are distinctly sinuous. There is one distinct short longitudinal palatalis situated above the columellar side of the peristome. One small columellar den-





ticle, not directed downwards and poorly visible in the aperture by apertural view. Because only one specimen was available for study, I did not damage the shell to observe the internal lamellae which remain unknown for this species. The operculum also remains unknown.

Differential diagnosis: Most similar to *Diplommatina waigeoensis* sp. nov. from Waigeo Island (see description of this species below) but differs specifically in having much shorter longitudinal palatalis (it is about twice longer in *D. waigeoensis* sp. nov.), stronger spiral striae and one whorl shorter shell (W = 7 in *D. waigeoensis* sp. nov. compared with 6 whorls in *D. maibrat* sp. nov.).

Ecology: Specimen was found on underside of a fallen leaf in primary lowland rainforest on limestone soil (karst area) in a narrow and wet ravine.

Distribution: New Guinea: lowlands of Doberai Peninsula.

Conservation status: Data Deficient, DD. This species is currently known from a single specimen. Further research is required to assess the distribution of this species, its population size, trend and highlight threats.

Diplommatina (s. l.) ***mertoni*** **C.R. Boettger, 1922**

(Figs 15, 129-131, plate 24 figs 18-23, map 15)

Holotype SMF: Senckenbg. Mus. [printed] 4686 [handwritten] Frankfurt a.M. [printed] Dipl. (Diplommatina) mertoni [underlined] C.BTTGR. TYPUS [printed, label red, glued on the main label] Batu Bandera, Maikor, Aru-Ins. H. Merton S. 9.IV.1908. [handwritten].

Paratypes 54 adults & 1 juv. SMF: Senckenbg. Mus. [printed] 4687 [handwritten] Frankfurt a.M. [printed] Dipl. (Diplommatina) mertoni [underlined] C.BTTGR. TYPUS [printed, glued on the main label] Batu Bandera, Maikor, Aru-Ins. H. Merton S. 9.IV.1908. [handwritten].

References: Boettger C.R. (1922: 359, 362, 401, pl. 22 figs 33-34), as *Diplommatina (Diplommatina) mertoni*; Zilch (1953: 21); van Benthem Jutting (1958a: 319), as *Diplommatina symmetrica*; van Benthem Jutting (1963: 711); Vermeulen (1996c: 112).

Measurements: Holotype H = 4.2 mm, D = 2 mm, HW = 2.4 mm, PD = 1.8 mm. Selected paratypic specimens: H = 4 mm, D = 2.05 mm, HW = 2 mm, PD = 1.6 mm; H = 3.9 mm, D = 2.1 mm, HW = 2.05 mm, PD = 1.6 mm; H = 3.65 mm, D = 1.95 mm, HW = 1.9 mm, PD = 1.7 mm.

Description: Shell is large, pale brown to yellowish with darker embryonic whorls, dextral, elongate, and rather broadly conical with convex apex. Shell with 8½-9 convex whorls, the 1 embryonic whorl is densely microscopically pitted. The suture is moderately deeply impressed. The ultimate whorl is rather bulbous, it is wider than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by a short zone of stronger developed sinuous axial ribs. The position of the constriction on same axis with the columellar side of the aperture. The teleoconch is sculptured with dense nearly straight axial ribs (ribs are sinuous on the apertural side of the ultimate whorl). There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those of the previous whorls and are strongly oblique to the coiling axis. There are 10-11 ribs per 1 mm. In certain specimens the ribs becoming weaker below the suture of the penultimate whorl, disappear almost completely and reappear again on the suture. Spiral striae are distinct and rather widely-spaced (3 rows of spiral striae per 50 µm measured on the ultimate whorl above the aperture at 200x magnification). The aperture is tilted about 40-45° to the coiling axis, it is subquadrate or circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is indistinctly double, thin in lateral view. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a continuous polished callus. The margin of the inner peristome is much stronger and more prominent than less conspicuous outer peristome. The palatal margins of both peristomes are slightly sinuous. There is one long and acute parietalis. There are three palatalis. One long longitudinally-transverse palatalis is ┐ shaped and situated over the columellar side of the aperture. Another oblique transverse palatalis is situated at the upper margin of the ultimate whorl in central position with regard to the aperture. The third long transverse palatalis is flat and inconspicuous, situated in parallel the with ┐ shaped palatalis. One distinct broad columellar denticle, not directed downwards (cd may be reduced in certain specimens). The columella is shiny and thin, obliquely twisted, forming an acute and oblique columellaris in its basal third. The operculum is primitive - semicircular, partly translucent, with inconspicuous concentric lines.

Ecology: Unknown.

Distribution: Aru Islands: Maikoor Island. Records from Misool Island (van Benthem Jutting 1958a: 295, 319; 1963: 711) refer to *Diplommatina telnovi* sp. nov. (see description of this species below).

Conservation status: Data Deficient, DD. This species is known from the type series sampled more than 100 years ago and has not been collect-






ed again. The habitat, population size and threats are unknown for *D. mertoni*. Further research is required to assess the distribution of this species, its population size, trend and threats.

Remarks: According to the original description, the type series consist of 57 specimens. Of them, only 56 were located at SMF.

Diplommatina (s. l.) ***moluccensis*** **sp. nov.** (Plate 25 figs 1-5, map 6)

http://zoobank.org/6B46E6F4-DA0B-4898-B7E7-9220EE7AADBC

Holotype NME: INDONESIA E, North Moluccas, Tidore Is., [outer slope of] caldera of Sabale volcano, 0°43'20"N, 127°26'16"E, 450-530 m, 29.VI.2013, secondary lowland rainforest, leaf litter, leg. K.Greķe.

Paratypes 31 adults, 7 subadults, 7 juv.: 13 adults KGC, 16 adults, 7 subadults & 7 juv. NME: same label as holotype; 2 adults UF: UF 426296 Mollusca, Diplommatinidae 2-spec. Diplommatina Indonesia, Maluku Utara Province Ternate Island, 3 km SE of Togafo disturbed rainforest 0.8093° 127.2948° John Slapcinsky 29 Oct 2008, JDS-0946 75% ethanol FLORIDA MUSEUM OF NATURAL HISTORY.

Derivatio nominis: Toponymic. This species is named after its area of origin, the Moluccas or Maluku.

Measurements (all adult shells are decollate): Holotype H = 2.1 mm, D = 1.05 mm, HW = 0.85 mm, PD = 0.8 mm. Selected paratypes from Tidore Island: H = 2.2 mm, D = 1.15 mm, HW = 0.8 mm, PD = 0.8 mm; H = 2.2 mm, D = 1.1 mm, HW = 0.8 mm, PD = 0.8 mm; H = 2.1 mm, D = 1.1 mm, HW = 0.8 mm, PD = 0.75 mm; H = 2.1 mm, D = 1.15 mm, HW = 0.85 mm, PD = 0.85 mm; H = 2.2 mm, D = 1.1 mm, HW = 0.9 mm, PD = 0.8 mm; selected paratype from Ternate Island H = 2.2 mm, D = 1.15 mm, HW = 0.85 mm, PD = 0.8 mm.

Description: Shell very small, whitish, dextral, narrow fusiform. Shell apex is convex in juvenile specimens (when not decollate). Shell with 6-6¼ convex whorls (shell is decollate in adult specimens), the 1½ embryonic whorl is smooth. The suture is rather deeply impressed. The penultimate whorl is bulbous. The ultimate whorl is strongly constricted and distinctly narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well defined by a distinct short impression. The constriction is situated ¼ whorl beyond the aperture. The teleoconch is sculptured with dense, straight axial ribs. The ribs becoming tilted in a direction opposite to the coiling axis in the upper parts near the suture on the last half whorl. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls. The ribs range from straight to slightly oblique to the coiling axis. There are 8-9 ribs per 0.5 mm. Spiral striae are lacking in adult specimens at 80x magnification (juv. and subadult shells are clearly finely and densely spirally striate). The aperture is tilted about 10-20° to the coiling axis, is semicircular and has entire apertural rim. The aperture is shifted right against the coiling axis in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is distinctly double, thin in lateral view. The inner peristome forms a continuous polished callus. The margins of the inner peristome are not sinuous. The basal margin of the outer peristome is slightly reflexed. Two palatalis are present. There is one transverse palatalis situated entirely beyond the parietal / palatal junction of the peristome. There is one longitudinal oblique parietalis. The columella is shiny and thin, obliquely twisted, forming an acute and oblique columellaris in its basal third. One very long columellar denticle is directed downwards. The operculum is primitive - circular, corneous, and translucent.

Differential diagnosis: Most similar to *Diplommatina leucopsis* van Benthem Jutting, 1958 and *D. lucifuga* van Benthem Jutting, 1958 (both from Sumba Island), but differs specifically in slender shell, very long columellar denticle (cd is rather small in both *D. leucopsis* and *D. lucifuga*), absence of spiral striae in adult specimens (spiral striae are distinct in *D. lucifuga*), and in straight basal side of the peristome (basal side of the peristome is round in both *D. leucopsis* and *D. lucifuga*).

Ecology: Specimens were sampled from under of wet leaves from litter accumulated in a large ground cavity in secondary lowland rainforest (under shady and wet conditions) on slope of old overgrown caldera of the volcano (clay-like rainforest soil). Specimen from Ternate Island was sampled in a disturbed rainforest.

Distribution: North Moluccas: Ternate & Tidore.

Conservation status: Endangered, EN B1ab(iii)+2ab(iii),B2ab(iii). Not enough data available to calculate current EOO; the current AOO is 8 km^2. This species is hitherto known from two small islands with active volcanoes as well as dense and growing human population. It is likely *Diplommatina moluccensis* sp. nov. also occurs on neighbouring islands (for example, Hiri, Moti and the western arms of Halmahera). This species EOO and AOO estimated at least twice what is currently known, but definitively below 500 km^2 for AOO. I assume this species historically inhabited primary rainforests, but is now limited to






secondary forests (primary rainforest has not existed on either islands for more than 100 years). The main threat is habitat loss as remaining secondary rainforest is cleared due to the expansion of human settlements (on Ternate island), wood consumption for various purposes (on both Ternate and Tidore islands) and conversion of rainforest into gardens and plantations (on both Ternate and Tidore). Considering the size of the EOO and its location on active volcanoes (patches of rainforest only present on volcanic slopes above 400 m and in old calderas on Ternate and Tidore), a very large volcanic eruption on one of the islands may in theory destroy a half of the current EOO (but considering the geological past of both Ternate and Tidore, such a super-eruption is very unlikely). This species is known from two locations considering the main threat. The population is not severely fragmented as the minimum distance between the islands is just 2.2 km. Despite the distance being so short, gene flow between subpopulations considered very low due to absence of species' habitat (forests) along the coast. Snails can potentially travel on floating material between two islands, but absence of suitable habitats along the coastline makes re-colonization very difficult. Transportation by birds or human (with substrate or plants) from one island to another is the most realistic scenario for gene exchange and re-colonization. Continuing decline is observed in extent and quality of habitat. Remaining lowland rainforests on Ternate and Tidore to be protected, green corridors between remaining forest patches to be maintained. Further search for *D. moluccensis* localities is required on neighbouring Hiri, Mare, Moti islands and on western Halmahera.

Diplommatina (s. l.) ***patani*** **sp. nov.** (Fig. 16, plate 25 figs 10-14, map 5)

http://zoobank.org/499BCB39-7C0F-459D-8045-84FF2F5DCDEE

Holotype NME: INDONESIA E, North Moluccas, Halmahera SE, Patani W, between the jetty & Patani, 0°18'10"N, 128°39'38"E, 15-50 m, 10.VII.2013, secondary lowland rainforest, leaf litter, leg. K.Greķe.

Paratypes 15 adults & 3 juv. NME, 11 adults KGC: same label as holotype.

Derivatio nominis: Named after Patani, local language and tribe in SE arm of Halmahera. Noun in apposition, invariable.

Measurements: Holotype H = 2.35 mm, D = 1.1 mm, HW = 1.1 mm, PD = 0.9 mm. Selected paratypic specimens: H = 2.2 mm, D = 1.1 mm, HW = 1 mm, PD = 0.8 mm; H = 2.2 mm, D = 1.1 mm, HW = 0.85 mm, PD = 0.8 mm; H = 2.2 mm, D = 1.05 mm, HW = 0.9 mm, PD = 0.85 mm; H = 2.1 mm, D = 1 mm, HW = 0.9 mm, PD = 0.8 mm.

Description: Shell is very small, white to pale brown, dextral, narrow and high conical with convex apex. Shell with 7 convex whorls, the 1½ embryonic whorl is smooth. The suture is moderately deeply impressed. The ultimate whorl is almost as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is very poorly defined by an inconspicuous shallow impression. The position of the constriction with the parietal wall of the aperture. The teleoconch is sculptured with coarse, dense, wavy sinuous axial ribs. The ribs becoming high, lamella-like and are slightly bending counter-clockwise on the periphery of each whorl. The ribs are also slightly bending counter-clockwise near and in the suture. The ribs are sinuous below the suture becoming weaker at the point of inflection and reappear again on the suture. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are straight to the coiling axis. There are 5-9 ribs per 0.5 mm. In certain specimens ribs becoming denser on the apertural side of the ultimate whorl. Spiral striae are distinct and dense. The aperture is tilted about 20° to the coiling axis and is circular to slightly ovoid and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is distinctly double, consists of several delicate dense lamellae in lateral view. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a continuous polished callus. The palatal and the basal margins of both peristomes are sinuous. Both the inner and outer peristomes provided with an obtuse angulation at the basal / columellar junction. There is one obtuse parietalis. There is one short palatalis situated over the columellar side of the peristome. The columella is shiny and thin, obliquely twisted, forming an acute oblique median columellaris. One small columellar denticle, not directed downwards. The operculum is primitive - circular, translucent and bears concentric lines.

Differential diagnosis: Most similar to *Diplommatina radiiformis* Preston, 1913 (North Moluccas). In *D. patani* sp. nov. the palatalis is comparatively shorter and situated lower down on the wall of the ultimate whorl (pt is closer to the columellar side of the peristome), but in *D. radiiformis* this pt is much longer and situated closer to the upper margin of the ultimate whorl, distant from the columellar side of the peristome. *D. patani* sp. nov. also






differs in higher and lamella-like ribs, especially on the periphery of whorls which is not the case in *D. radiiformis*.

Ecology: This species found in distirbed secondary lowland rainforest on limestone soil, but presumably also inhabits primary lowland rainforests. Specimens observed on undersides of leaves accumulating at base of limestone rock formations and at buttress roots of large trees.

Distribution: North Moluccas: south-eastern arm of Halmahera Island.

Conservation status: Data Deficient, DD. *Diplommatina patani* sp. nov. is currently known from single locality, therefore current EOO cannot be calculated. The maximum EOO estimated about 1500 km^2 taking into account the distribution of limestone soils in south-eastern Halmahera. The current AOO is 4 km^2. The maximum AOO is likely higher but definitively below 500 km^2. The population size and trend are unknown, but this species is locally abundant. Habitat loss (lowland rainforests on limestone) considered the main threat for this species. Forested area of Halmahera's south-eastern arm is decreasing consequently; between 2001 and 2014 about 11000 ha of the rainforest were lost (calculated for canopy density over 25% according to the Global Forest Watch (2016)). Taking into account constantly growing human population on the North Moluccas and presence of large functioning nickel mine in Central Halmahera (which is attracting workers from other regions of Indonesia), this trend is likely to continue. Further research is required to assess the distribution of *D. patani* sp. nov., its population size, trend and threats.

Diplommatina (s. l.) ***radiiformis*** **Preston, 1913**

(Figs 17-18, 111, plate 25 figs 15-24, map 5)

Holotype NHMB: Diplommatina radiiformis Preston Type lsd. of Beilan Beilan ~~Dutch E. Indies.~~ [original correction] Moluccas. 1914.1.7.463 25-15 [handwritten] / Type. [printed] / radiiformis Preston Moluccas [handwritten].

Additional material: 1 subadult LKCNHM: Indonesia: Maluku, Halmahera, N of Weda. leg. Tony Whitten, 11 January 2013; 3 adults KGC & 2 adults NME: INDONESIA E, North Moluccas, Tidore Is., [outer slope of] caldera of Sabale volcano, 0°43'20"N, 127°26'16"E, 450-530 m, 29.VI.2013, secondary lowland rainforest, leaf litter, leg. K.Greķe; 2 adults KGC: INDONESIA E, North Moluccas, Halmahera N, Galela area, Mt. Ngededo Ma Girapang at Roko vill., 1°50'07"N, 127°43'17"E, 230 m, 02.VII.2013, primary & secondary lowland rainforest, leaf litter, leg. K.Greķe.

References: Preston (1913: 437).

Measurements: Holotype H = 2.4 mm, D = 1.1 mm, HW = 1.1 mm, PD = 0.85 mm. Specimens from Tidore Island: H = 2.2 mm, D = 1 mm, HW = 1 mm, PD = 0.8 mm; H = 2.15 mm, D = 1.1 mm, HW = 1 mm, PD = 0.8 mm; H = 2.35 mm, D = 1.2 mm, HW = 1.05 mm, PD = 0.9 mm.

Description: Shell is very small, white with pale brown protoconch, dextral, narrow and high conical with convex apex. Shell with 7 convex whorls, the 1½ embryonic whorl is densely microscopically pitted. The last half of the protoconch is especially densely pitted and the pits are arranged in axial rows. The suture is moderately deeply impressed. The penultimate whorl is slightly bulbous. The ultimate whorl is somewhat constricted, it is slightly narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by a short and shallow impression. The constriction is situated on same axis with the palatal side of the aperture. The teleoconch is sculptured with coarse, dense, irregularly sinuous axial ribs. In fully grown specimens the ribs becoming high, lamella-like and are slightly bending counter-clockwise on the upper part of each whorl. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are straight to the coiling axis, but slightly oblique on last two whorls. There are 5-6 ribs per 0.5 mm, the ribs becoming denser on the apertural side of the ultimate whorl. Spiral striae are delicate but distinct and dense. The aperture is tilted about 15-20° to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is distinctly double, consists of a few delicate lamellae in lateral view. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a continuous polished callus. The margins of the inner peristome are not or slightly sinuous. The palatal margin of the outer peristome is sinuous. There is one long longitudinal palatalis in the upper part of the ultimate whorl, close to the suture and situated over the columellar side of the aperture. The columella is shiny, obliquely twisted, forming an acute and oblique columellaris in its basal third. One small pointed columellar denticle, not directed downwards. The operculum is primitive - translucent, circular and bears concentric lines.

Ecology: On Tidore specimens were sampled from under of wet leaves in leaf litter accumulated in a large depression in the ground, in secondary lowland rainforest (under shady and wet conditions) on slope of old, overgrown caldera of the volcano (clay-





like rainforest soil). On Halmahera, specimens were found on undersides of wet leaves in litter of primary lowland rainforest (already being disturbed) on a limestone slope.
Distribution: North Moluccas: Belangbelang Island of Obi Islands group, Tidore Island, Halmahera Island.
Conservation status: Least Concern, LC. The current EOO is 3970 km^2. The maximum EOO estimated 40000 km^2 and also includes Ternate, Bacan, Obira and southern arm of Halmahera. There are no recent records from Obi Islands for this species. However, primary rainforest habitats are still available in this part of North Moluccas. The current AOO is 12 km^2, the maximum AOO is likely much higher and is predicted between 500 and 1000 km^2 considering available habitat. This species limited to secondary forests on Tidore (primary rainforest has not existed here for more than 100 years). On Halmahera it occurs in primary rainforests on limestone soil. There are at least three locations known for this species. The population size and trend are unknown. The population is severely fragmented as is presently known. This species is known from several islands with active volcanoes. Both Tidore and Halmahera have constantly growing human population, similarly to other North Moluccan islands. Habitat (lowland rainforests) loss and altering considered the main threats, in particular due to the expansion of human settlements, wood consumption for various purposes and conversion of remaining rainforest into gardens and plantations. Considering large distribution area of *D. radiiformis*, habitat decline is unlikely to affect all subpopulations at same time. Further research is required to assess the distribution, population size and trend for *D. radiiformis*.

Diplommatina (s. l.) ***slapcinskyi*** **sp. nov.** (Fig. 19, plate 21 figs 14-17, map 6)
http://zoobank.org/0613C0B5-37FA-4168-A35E-5887688BB26C
Holotype UF (No 508076): UF 426407 Mollusca, Diplommatinidae 5-spec. *Diplommatina sp. 3* Indonesia, Maluku Utara Province Obi Island, border of garden and rainforest 2.3 km N of Woi gardens and rainforest 150 meters -1.7045° 127.6067° John Slapcinsky 26 Oct 2008, JDS-0942 dry FLORIDA MUSEUM OF NATURAL HISTORY.
Paratypes 26 specimens: 4 UF: same label as holotype; 14 adults, 1 subadult, 2 juv. UF & 6 adults KGC: UF 426265 Mollusca, Diplommatinidae 15-spec. *Diplommatina* Indonesia, Maluku Utara Province Obi Island, border of garden and rainforest 2.3 km N of Woi gardens and rainforest 150 meters -1.7045° 127.6067° John Slapcinsky 26 Oct 2008, JDS-0942 75% ethanol FLORIDA MUSEUM OF NATURAL HISTORY.

Derivatio nominis: Patronymic. This species is named after the first collector, famous malacologist and specialist on Papuan malacofauna, my colleague John Slapcinsky (UF).
Measurements: Holotype H = 2.7 mm, D = 1.15 mm, HW = 1 mm, PD = 0.95 mm. Selected paratypes: H = 2.8 mm, D = 1.35 mm, HW = 1.2 mm, PD = 1.1 mm; H = 2.7 mm, D = 1.3 mm, HW = 1.15 mm, PD = 1.1 mm; H = 2.7 mm, D = 1.4 mm, HW = 1.15 mm, PD = 1 mm; H = 2.7 mm, D = 1.3 mm, HW = 1.2 mm, PD = 1 mm; H = 2.7 mm, D = 1.35 mm, HW = 1.1 mm, PD = 1.1 mm.
Description: Shell is very small, white, dextral, narrow and high conical with a convex apex. Shell with 8 convex whorls, the 1½ embryonic whorl is smooth. The suture is deeply impressed. The ultimate whorl is only slightly narrower than the penultimate whorl in apertural view. The umbilicus is closed in adults. The constriction is poorly defined by a short shallow impression. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse, widely-spaced, wavy curved axial ribs like flat lamellae. The highest ribs are on the 6-7 whorls. There are no abrupt changes in ribbing pattern. The ribs are synchronized with those of previous whorls and are straight or slightly oblique to the coiling axis. There are 3-4 ribs per 0.5 mm. Spiral striae are distinct and dense. The aperture is tilted about 20° from the coiling axis, is irregularly oval or rhomboid and has entire apertural rim. The parietal margin of the peristome is attached to the ultimate whorl. The aperture is slightly shifted right against the coiling axis in apertural view. The peristome is double. The inner peristome forms a continuous polished callus. The margins of the inner peristome are not sinuous. The palatal margin of the outer peristome is slightly sinuous. There is one acute parietalis and one long longitudinal palatalis near the columellar side of the aperture. The columella is shiny, obliquely twisted, forming a very strong acute and oblique columellaris in its basal third. One small but distinct columellar denticle, not directed downwards. The operculum is primitive - circular and transparent, without concentric ridges.
Differential diagnosis: This species is peculiar due to the presence of high and wavy curved, lamella-like axial ribs.
Ecology: This species inhabits primary and secondary lowland rainforests, as well as gardens and occurs in leaf litter.






Distribution: Southernmost North Moluccas: Obi Islands, Obira Island.
Conservation status: Data Deficient, DD. This species is known from a single locality. Not enough data available to calculate current EOO. The maximum EOO is below 5000 km^2 taking into account the area of Obi Islands. The current AOO is 4 km^2. The maximum AOO is likely much higher, but definitively less than 500 km^2. The population size and population trends are unknown. The population is not severely fragmented. Currently there is one location but more than 5 locations are considered with regard to the maximum EOO. Habitat loss and decline in habitat quality caused by logging, mining (on Obira Island), conversion of the forest into gardens and plantations, and expansion of settlements in lowland areas considered the main threats. Between 2001 and 2014 the forested part of the maximum EOO has decreased by over 14000 ha (calculated for canopy density over 25% according the Global Forest Watch (2016)). Considering human population growth in the area, this trend is likely to continue. Additional research is required in order to clarify species distribution, population size, trends and highlight threats.

Diplommatina (s. l.) ***smithi*** **Kobelt et von Möllendorff, 1898** (Plate 25 figs 6-9, map 22)
= *Diplommatina papuana* E.A. Smith, 1897
Lectotype BMNH [herewith designated]: Diplom. papuana Smith Kapaur New Guinea 97-7-30.57-8 [handwritten] / papuana, Smith Kapaur New Guinea [handwritten].
Paralectotype 1 adult BMNH [herewith designated]: same labels as lectotype.

Lectotype designation: Lectotype is selected from two syntyes with identical labels.
References: Smith E.A. (1897b: 418, pl. 9 figs 28-29), as *Diplommatina papuana* nec *D. papuana* Tapparone-Canefri, 1883; Kobelt & von Möllendorff (1898: 142), as *Diplommatina* Subgen. *Sinica* Mlldff. *smithi* Kob. et. Mlldff. nec *D. papuana* Sm.[ith] Tap.[parone] Can.[efri, 1883]; Kobelt (1902: 473); van Benthem Jutting (1963: 712).
Measurements: Lectotype H = 3.1 mm, D = 1.9 mm, HW = 2 mm, PD = 1.5 mm.
Description: Shell is small, creamy with brown embryonic whorls, sinistral, short, conical with convex apex. Shell with 6 convex whorls, the 1¼ embryonic whorl is microscopically pitted. The suture is rather deeply impressed. The ultimate whorl is rather bulbous and wider than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by axial ribs becoming sinuous in this area. The constriction is situated on same axis with the columellar side of the aperture. The teleoconch is sculptured with coarse, dense, nearly straight axial ribs (ribs are slightly sinuous on the apertural side of the ultimate whorl). There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those of the previous whorls and are oblique to the coiling axis. There are 9 ribs per 1 mm. Spiral striae are distinct, rather strong and widely-spaced. The aperture is tilted about 25-30° to the coiling axis, is oval or semicircular with apertural rim broadly discontinued parietally. The aperture is more or less centered below the penultimate whorl in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is double, thin in lateral view. The parietal side of the peristome is pressed against the parietal wall. The inner peristome forms a continuous polished callus on the palatal and the basal sides. Two obtuse protrudings developed on the columellar and on the basal margins of the outer peristome. The margin of the outer peristome expands beyond the inner peristome near the palatal / parietal junction. It is unclear if there is any parietalis or not (not visible through the shell wall in historical specimens). There is one transverse palatalis situated on the parietal wall over the peristome. Another long longitudinal palatalis situated over the columellar side of the peristome. One small and inconspicuous columellar denticle, not directed downwards. Internal lamellae were not studied. Operculum is unknown.
Ecology: Unknown.
Distribution: New Guinea: Onin Peninsula. Record from northern New Guinea by Bavay (1908) is misidentification of *Palaina consobrina* van Benthem Jutting, 1963.
Conservation status: Data Deficient, DD. This species is known from the type series sampled more than 100 years ago and has not been reported again. Additional research is required to clarify status of this species in the wild, assess its distribution, population size, trends and highlight threats.

Diplommatina (s. l.) ***symmetrica*** **Hedley, 1891**
(Figs 20 & 136, plate 26 figs 1-5, map 25)
Lectotype BMNH [herewith designated]: Diplommatina symmetrica Hedley Cotype Basilaki, B.N.Guinea 9.2.2.4-100-104, C.Hedley Esq. [handwritten].
Paralectotypes 6 adults BMNH: same label as lectotype.

Lectotype designation: Lectotype is selected






from series of 7 syntypes, all with the same label.
Note: Iredale (1941: 62) established a new genus *Euadnita* with the type species *Diplommatina symmetrica*. Here I follow Egorov (2013) and consider *Euadnita* a junior synonym of *Diplommatina*.
References: Hedley (1891: 107, pl. 12 fig. 39); Kobelt & von Möllendorff (1898: 138), as *Diplommatina* Subgen. *Eudiplommatina* Kob. et Mlldff. *symmetrica*; Kobelt (1902: 447), as *D. (D.) symmetrica*; Soós (1911: 349); Leschke (1912a: 145); Iredale (1941: 63), as *Euadnita symmetrica*.
Measurements: Lectotype H = 3.4 mm, D = 1.6 mm, HW = 1.7 mm, PD = 1.3 mm. Selected paralectotypic specimens: H = 3.55 mm, D = 1.6 mm, HW = 1.7 mm, PD = 1.4 mm; H = 3.5 mm, D = 1.55 mm, HW = 1.7 mm, PD = 1.3 mm.
Description: Shell large, white translucent, dextral, narrowly conical with convex apex. Shell with 7½ convex whorls, the 1½ embryonic whorl is densely microscopically pitted. The suture is rather deeply impressed. The penultimate whorl is not bulbous, as wide as the ultimate whorl in apertural view. The constriction is poorly defined by axial ribs becoming denser and stronger sinuous. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse, very widely-spaced straight axial ribs. The ribs are incomplete, not reaching the upper suture on all whorls (except the ultimate whorl where the ribs are complete). There are no abrupt changes in the ribbing pattern but the ribs are more widely-spaced on early teleoconch whorls than on the pen- and ultimate whorls. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are 5-6 ribs per 1 mm. Spiral striae are delicate and dense (3 rows of spiral striae per 30 μm measured on the ultimate whorl above the aperture by 300x magnification). The aperture is tilted about 30-35° to the coiling axis, is oval or semicircular has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, very thin in lateral view. The parietal margin of the peristome is attached to the ultimate whorl. Peristomal margins are not sinuous. There is one long and acute parietalis. There is one long longitudinally-transverse ┐ shaped palatalis situated over the columellar side of the peristome. The columella is smooth, obliquely twisted, forming an oblique columellaris in basal third. The columellar denticle inconspicuous, not directed downwards. The operculum is primitive - circular, not transparent and without concentric lines or ridges.
Ecology: Specimens were sampled from decaying leaves of *Pandanus* sp. on a steep hill.
Distribution: Louisiade Islands. Record from northern New Guinea (Soós 1911) is very doubtful (this material was not available for my study since Soós's collection was lost in the fire at the Hungarian Natural History Museum). Records from Onin Peninsula of New Guinea (Smith 1897b: 418, pl. 9 fig. 27) and Misool Island (van Benthem Jutting 1958a: 295, 319; 1963: 711) are based on misidentified specimens of *D. telnovi* sp. nov. (see description of this species below).
Conservation status: Data Deficient, DD. This species is known from historical specimens collected more than 100 years ago from one locality. Further research is required in order to clarify species' status in the wild, assess its distribution, population size, trends and highlight threats.

Diplommatina (s. l.) ***telnovi* sp. nov.** (Figs 21, 132-135, plate 26 figs 6-21, map 22)
http://zoobank.org/AB75DD64-3232-416A-911B-E37A6A6D2496
Holotype NME: INDONESIA E, W New Guinea, Doberai Peninsula, Ayamaru vill. ~15,5-14 km N, 1°08'04"S, 132°10'59"E to 1°09'29S, 132°11'30"E, ~275-250 m, 02.IX.2015, primary lowland rainforest on limestone, leg. D.Telnov.
Paratypes 25 specimens: 2 adults NME, 2 KGC, 1 juv. KGC: same label as holotype; 2 adults NME, 3 KGC: INDONESIA E, W New Guinea, Doberai Peninsula, Ayamaru vill. 27 km SE, Uter lakeside, 1°26'03S, 132°23'09"E, ~185 m, 04.IX.2015, primary lowland rainforest on limestone, base of limestone cliff, leg. D.Telnov; 2 adults KGC: INDONESIA E, W New Guinea, Doberai Peninsula, Ayamaru vill. 23 km SE, Aqafu springs, 1°23'15S, 132°22'04"E, ~330-340 m, 04.IX.2015, primary lowland rainforest on limestone, near the springs, leg. D.Telnov; 6 adults NME, 5 adults & 1 subadult KGC: INDONESIA E, Raja Ampat, Misool Island (central), River Gam upstream, Gamta vill. 12-14 km NW, 01°57'50"S, 130°11'09"E, 70-350 m, 04-06.II.2012, primary lowland rainforest on limestone, leg. D.Telnov; 1 adult & 1 subadult KGC: INDONESIA E, West PAPUA, Onin Peninsula, Fak-Fak 10 km E, 2°56'32"S, 132°23'01"E, Sakarteman vill. 1-4 km W, River Sakarteman valley, 350-450 m, 26.IX.2010, primary lowland rainforest on limestone, leg. K.Greķe.

Derivatio nominis: Patronymic. This species is named after its collector, famous entomologist Dr. Dmitry Telnov (The Entomological Society of Latvia, Rīga).
References: Smith E.A. (1897b: 418, pl. 9 fig. 27), as *Diplommatina symmetrica*; van Benthem Jutting (1958a: 295, 319), as *Diplommatina symmetrica*; van Benthem Jutting (1963: 711), as *Diplomma-*






tina symmetrica.

Measurements: Holotype H = 3.4 mm, D = 1.9 mm, HW = 1.9 mm, PD = 1.55 mm. Selected paratypic specimen from locus typicus: H = 3.3 mm, D = 1.75 mm, PD = 1.5 mm. Selected paratypic specimens from Uter lake env.: H = 3.7 mm, D = 2 mm, HW = 2 mm, PD = 1.6 mm; H = 3.45 mm, D = 1.4 mm, PD = 1.5 mm; H = 3.35 mm, D = 1.9 mm, PD = 1.3 mm. Selected paratypic specimens from Misool: H = 3.8 mm, D = 2 mm, PD = 1.6 mm; H = 3.55 mm, D = 2 mm, PD = 1.5 mm. Selected paratypic specimens from Onin Peninsula: H = 3.6 mm, D = 2 mm, HW = 1.8 mm, PD = 1.5 mm.

Description: Shell is large, reddish to pale brown with bright orange embryonic whorls in adult (whitish to yellowish when juvenile), dextral, elongate, and rather broadly conical with convex apex. Shell with 7¾ convex whorls, the 1½-2 embryonic whorls are densely microscopically pitted. The suture is rather deeply impressed. The ultimate whorl rather bulbous, it is wider than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by axial ribs becoming denser and stronger sinuous. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse, dense, sinuous axial ribs (the ribs are humped on the ultimate whorl in apertural view). The ribs are C-like sinuous below the suture, becoming weaker at the point of inflection resulting in a spiral groove below the suture (perfectly visible in subadult specimens in top view, Plate 26 fig. 21). There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are 8-10 ribs per 1 mm. Spiral striae are very delicate, dense (5 rows of spiral striae per 50 µm measured on the ultimate whorl above the aperture by 200x magnification). The aperture is tilted about 25-35° to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is distinctly double, thin in lateral view. The inner peristome forms a continuous polished callus on the palatal, basal and columellar margins. Both the inner and outer peristomes are more or less equally strong, with a few delicate lamellae in-between. In certain specimens the palatal margin of the outer peristome is slightly sinuous. There is one high and acute parietalis. There are three palatalis. One long longitudinally-transverse ┐ shaped palatalis situated above the columellar side of the peristome. Another obliquely transverse palatalis situated near the suture / upper side of the ultimate whorl in central position regarding to the aperture. The third long transverse palatalis is inconspicuous and is running parallel with ┐ shaped one. The columella is shiny, obliquely twisted, forming a strong acute oblique median columellaris. One distinct columellar denticle, not directed downwards. The operculum is primitive - semicircular, transparent, with few concentric lines.

Differential diagnosis: This species is extremely similar to *Diplommatina mertoni* C.R. Boettger, 1922 (Aru Islands) and *D. symmetrica* Hedley, 1891 (Louisiade Islands). Consider table 8 for diagnosis of these species. Thus, the characters slightly vary (comparative specimens are mandatory for proper identification). In general, genetic analysis is required to highlight phylogenetic relationships between these three species.

Table 8. Papuan species of *Diplommatina* s. l. similar to *D. telnovi* sp. nov. and their distinctive characters.

Species	**Character**	**Character in *D. telnovi* sp. nov.**
Diplommatina mertoni	shell generally less slender and larger, H = 3.65-4.2 mm, peristome is indistinctly double with the outer peristome less strong than the inner one, 3 rows of spiral striae per 50 µm (measured on the ultimate whorl above the aperture), 10-11 axial ribs per 1 mm	shell generally slender and smaller, H = 3.6-3.8 mm, peristome is distinctly double with both the inner and outer peristomes equally strong and prominent, 5 rows of spiral striae per 50 µm (measured on the ultimate whorl above the aperture), 8-10 axial ribs per 1 mm
D. symmetrica	shell generally slender, 5-6 axial ribs per 1 mm, axial ribs less conspicuously curved in their upper parts	shell generally less slender, 8-10 axial ribs per 1 mm, axial ribs C-like curved in their upper parts

Phylogeny: According results of COI analysis (specimens sampled ~15 km N of Ayamaru vill.) this species represents Webster's et al. (2012) clade E and demonstrates far relationship with Bornean *D. gomantongensis* E.A. Smith, 1894 and North Moluccan *Diancta constricta* (Martens, 1864) (consider chapter "Phylogeny").

Ecology: This species occurs in primary lowland rainforests on limestone soils or on dolomite. Specimens were sampled from underside of large fallen






leaves in wet leaf litter, also at base of limestone rocks and near large standing trees.
Distribution: New Guinea: lowlands of Doberai Peninsula & Onin Peninsula; Raja Ampat Islands: Misool Island.
Conservation status: Least Concern, LC. The current EOO is 28000 km^2, however the maximum EOO estimated over 60000 km^2. The current AOO is 28 km^2. The maximum AOO is likely at least 500 km^2 considering available habitat. The population size is unknown, but this species in not uncommon. There are at least 5 locations considering the presently known distribution and with regard to the main threat. Habitat loss and alteration qualify as the main threats. Both Misool Island and Onin Peninsula of New Guinea not suffered from deforestation and primary rainforest loss (Global Forest Watch 2016). Southern lowlands of Doberai Peninsula are affected by deforestation caused primarily by oil-drilling industry, strong development due to the Papuan Autonomy (investments) and growing human population. Still, there are vast areas of untouched forests available for *D. telnovi* sp. nov. in this area. I cannot predict significant decline in the EOO or AOO for this species within the next 10 years.

Diplommatina (s. l.) ***timorensis*** **sp. nov.** (Fig. 22, plate 25 figs 25-29, map 12)
http://zoobank.org/3DDDF152-329A-444A-95B8-54CB79CE812B
Holotype NME: INDONESIA E, Timor W, Fatumnasi vill. 3 km NNE, 9°37'28"S, 124°14'19"E, 1620-1630 m, 05.IV.2016, base of limestone outcrop, leaf litter, leg. L.Wagner.

Derivatio nominis: Toponymic. This species is named after its area of origin, Timor Island.
Measurements: Holotype (adult shell is decollate) H = 2 mm, D = 0.95 mm, HW = 0.9 mm, PD = 0.7 mm.
Description: Shell is small, yellowish, dextral, narrow and high conical. Shell with 4½ convex whorls (adult shell is decollate), number of embryonic whorls is unknown. The suture is rather deeply impressed. The ultimate whorl is as wide as the penultimate whorl in apertural view. The umbilicus is narrowly open, perspective. The constriction is poorly defined by a short and shallow impression. The constriction is situated on same axis with the columellar side of the aperture. The teleoconch is sculptured with fine, dense, straight axial ribs. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are slightly oblique to the coiling axis. There are about 12-13 ribs per 0.5 mm. Spiral striae are delicate and dense. The aperture is not or slightly tilted to the coiling axis, is oval or subquadrate and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is simple and forms a continuous polished callus. The parietal margin is attached to the ultimate whorl. The palatal margin of the peristome is slightly sinuous. There is one very high and acute parietalis. The columella is shiny, obliquely twisted, forming an acute oblique median columellaris. One very inconspicuous flat columellar denticle, not directed downwards and not visible in the aperture in apertural view. Operculum is unknown.
Differential diagnosis: This new species is similar to several *Diplommatina* with fusiform and decollate shells from Lesser Sunda Islands (*D. floris* B. Rensch, 1931, *D. fluminis* B. Rensch, 1931, *D. leucopsis* van Benthem Jutting, 1958b, *D. lucifuga* van Benthem Jutting, 1958b) and North Moluccas (*D. moluccensis* sp. nov.; see description of this species above). *D. timorensis* sp. nov. is conspicuous primarily in having open umbilicus, simple peristome (peristome is clearly double in *D. floris, D. leucopsis, D. lucifuga, D. moluccensis* sp. nov.), very flat columellar denticle which is not visible in apertural view (cd is distinct in *D. leucopsis* and *D. moluccensis* sp. nov.) and in both the ultimate and penultimate whorls being of equal width (the ultimate whorl is distinctly narrower than the penultimate whorl in apertural view in *D. fluminis* and *D. leucopsis*).
Ecology: This species was found in leaf litter of lower montane rainforest at base of the limestone outcrop at ~1600 m altitude.
Distribution: Lesser Sunda Islands: Timor Island.
Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. The maximum EOO for this species estimated less than 20000 km^2 taking into account the area of Timor and the distribution of rainforests on this predominantly arid island. The population size and trend as well as threats are unknown for this species. Further research is required to clarify distribution, population size, trends and highlight threats for *D. timorensis* sp. nov.

Diplommatina (s. l.) ***torquilla*** **van Benthem Jutting, 1958** (Plate 27 figs 1-3, map 12)
Holotype NHMB: Holotypus [handwritten] / Diplommatina Stal. 373 Holotypus torquilla [handwritten] / 6081 a Sumba,Kodi [printed] / HOLOTYPUS [printed, label pink,






glued on glass].
Paratypes 3 adults & 2 juv. NHMB: Paratypen [handwritten] / Diplommatina torquilla n. sp. Paratypen [handwritten] / Naturhist. Museum Basel Coll. Dr. Bühler Dr. Sutter 1949 Kodi Sumba 373 [printed] / 6081 b Sumba,Kodi [printed] / PARATYPOIDE [printed, label light green, glued on glass] [two adults are badly broken].

References: van Benthem Jutting (1958b: 97, pl. 1 fig. 4); Monk et al. (1997: 395).
Measurements: Holotype (adult shell is decollate) H = 2.5 mm, D = 1.3 mm, HW = 1.1 mm, PD = 0.83 mm. Selected paratypic specimens (adult shells are decollate) H = 2.4 mm, D = 1.2 mm, PD = 0.8 mm; H = 2.35 mm, D = 1.25 mm, PD = 0.8 mm.
Description: Shell is very small, white, dextral, narrow and high conical. Shell with 5½-6 convex whorls (adult shell is decollated), number of embryonic whorls is unknown. The suture is deeply impressed. The penultimate whorl is bulbous. The ultimate whorl is constricted, distinctly narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by a short and shallow impression. The constriction situated slightly beyond the aperture in apertural view. The teleoconch is sculptured with coarse, very widely-spaced, straight axial ribs. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are straight to the coiling axis. There are about 4 ribs per 0.5 mm, the ribs becoming denser on the apertural side of the ultimate whorl. Spiral striae are distinct and dense. The aperture is tilted about 10-15° to the coiling axis, is oval and has entire apertural rim. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is double, thin in lateral view. The palatal margins of both the inner and outer peristomes are sinuous. The inner peristome forms a continuous polished callus. One small but distinct columellar denticle, not directed downwards. No specimens were available to study the internal lamellae. Operculum is unknown.
Ecology: Unknown.
Distribution: Lesser Sunda Islands: Sumba Island.
Conservation status: Data Deficient, DD. *Diplommatina torquilla* is known from type series sampled about 70 years ago from single locality. This species has not been collected again. Further research is required to clarify status of this species in the wild, assess its distribution, population size, trends and highlight threats.

Diplommatina (s. l.) ***waigeoensis*** **sp. nov.** (Figs 23-24, plate 27 figs 4-11, map 20)
http://zoobank.org/E6561481-90B1-4E7B-A066-39FD16C092F3
Holotype NME: INDONESIA E, Raja Ampat, Waigeo Island, Majalibit Bay, Waisai 19 km NE, River Werabiai valley, 00°18'02"S, 130°56'00"E, 40-60 m, 20.II.2012, primary lowland rainforest on limestone, D.Telnov.
Paratypes 84 specimens: 25 adults, 1 subadult, 2 juv. NME, 23 adults KGC, 3 LKCNHM & 4 SMF: same label as holotype; 12 adults & 1 juv. KGC: INDONESIA E, Raja Ampat, Waigeo Island, Waisai 10-13 km NE, 00°21'17"S, 130°54'37"E, ~70 m, 16.II.2012, primary lowland rainforest on limestone, leg. D.Telnov; 1 adult NME & 1 adult KGC: INDONESIA E, Raja Ampat, Waigeo Island, Waisai 3 km W, 00°26'04"S, 130°47'41"E, 40-50 m, 17.II.2012, secondary lowland rainforest on limestone, leg. D.Telnov; 2 adults, 2 subadult NME & 3 adults KGC: INDONESIA E, Raja Ampat, Waigeo Island, Waisai 10 km NWW, 00°24'46"S, 130°44'11"E, 70-200 m, 19.II.2012, primary lowland rainforest on limestone, leg. D.Telnov; 4 adults KGC: INDONESIA E, Raja Ampat, Waigeo Island, Waisai 4,5 km SW, Waiwo dive resort, 00°26'07"S, 130°46'45"E, 10-15 m, 21.II.2012, primary lowland rainforest on limestone, leg. D.Telnov.

Derivatio nominis: Toponymic. Named after Waigeo Island, the area of origin of this species.
Measurements: Holotype H = 3 mm, D = 1.6 mm, HW = 1.5 mm, PD = 1.2 mm. Selected paratypic specimens from type locality: H = 3.2 mm, D = 1.7 mm, HW = 1.6 mm, PD = 1.25 mm; H = 3.2, D = 1.7 mm, HW = 1.6 mm, PD = 1.3 mm. Selected paratypic specimens from Waisai 3 km W: H = 2.9 mm, D = 1.7 mm, PD = 1.2 mm; H = 2.9 mm, D = 1.65 mm, PD = 1.15 mm. Selected paratypic specimens from River Werabiai valley: H = 3.1, D = 1.75 mm, PD = 1.3 mm; H = 2.9 D = 1.6 mm, PD = 1.2 mm.
Description: Shell is small, corneous to pale orange, sinistral and rather broadly conical with convex apex. Shell with 7 convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is moderately deeply impressed. The ultimate whorl is wider than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction very poorly defined by very shallow inconspicuous impression. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse, dense, straight to slightly sinuous axial ribs. There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those of the previous whorls and are straight to the coiling axis. There are 7 ribs per 0.5 mm. Spiral striae are very delicate, dense, becoming more distinct on the last half whorl. The aperture is not or barely tilted to the coiling axis, is subquad-






rate and has entire apertural rim. The peristome is double, thin in lateral view. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a continuous polished callus. The palatal and the basal margins of the outer peristome are distinctly sinuous. Three obtuse protrudings present each on the palatal, basal and columellar sides (last one is less distinct) of the outer peristome. There is one high and acute parietalis. There is one distinct long longitudinal palatalis situated over the columellar and the parietal sides of the aperture. The columella is shiny, obliquely twisted, forming very broad oblique basal columellaris which strongly widening backwards. One small columellar denticle, not directed downwards. The operculum is primitive - semicircular, translucent and with concentric lines.

Differential diagnosis: This new species is distinctive due to the structure of the columellaris which is provided with very broad oblique prebasal lamella. Most closely related *Diplommatina maibrat* sp. nov. from southern lowlands of Doberai Peninsula, West New Guinea (see description of this species above) but differs specifically in shorter palatalis (palatalis is twice so long in *D. waigeoensis* sp. nov.). Spiral striae are less distinct in *D. waigeoensis* sp. nov. than in *D. maibrat* sp. nov. and there is one more whorl (W = 6 in *D. maibrat* sp. nov.).

Ecology: Specimens were sampled from underside of wet fallen leaves in primary lowland rainforests on limestone (karst area). This species is connected with wet rainforest litter accumulating at base of limestone rocks and near buttress roots of large trees.

Distribution: Raja Ampat Islands: Waigeo Island.

Conservation status: Endangered, EN B1B2ab(iii,iv). This species inhabits both western and eastern peninsulas of Waigeo and is hitherto reported from three localities, all in the southern part of this island. The current EOO is about 100 km^2, the maximum EOO estimated below 5000 km^2 (taking into account the area of Waigeo and adjacent islets as well as available habitat). The current AOO is 20 km^2, but the maximum AOO estimated less than 500 km^2 taking into account available habitat and soil types as well as biogeographical peculiarities of Waigeo. The population size is unknown, but this species is rather abundant in primary lowland rainforests on limestone soils. The population is not fragmented. Decline in extent and quality of habitat caused by conversion of rainforest into gardens, timber collecting and small-scale logging considered the main threat for this species. It results in habitat alteration, fragmentation and decline in AOO. Growing human population of southern Waigeo and increasing tourism in this area (both national and international) are demanding more gardens, infrastructure (roads, airport, sea ports) and resorts. Waigeo became the regency capital of Raja Ampat administrative province of Indonesia couple of years ago. This boosted local development, increasing investments into Waisai, the new regency capital. Provincial airport has been established and Waigeo Ring road was build; this happened in coastal area which was covered by primary rainforest just 10 years ago. Waigeo is initially rich in limestone rocks and the limestone is widely used for road and buildings construction. Human population is growing mostly as a result of immigration from other islands of Indonesia. New inhabitants require more firewood and charcoal. An illegal logging is rare but is a reality to reckon with. Aforementioned factors caused decline in extent of primary lowland rainforests, especially in SW of Waigeo. This trend is observed, projected and likely to continue in the future. Specimens of *D. waigeoensis* sp. nov. were not yet observed in disturbed forests. However they possible may survive also in a secondary rainforests with closed canopy (wet litter is the key). I consider there are at least two locations known for this species (W and E peninsulas of Waigeo). Between 2001-2014 south-western Waigeo lost just about 1100 ha of the rainforest (calculated for canopy density over 25% according to the Global Forest Watch (2016)), but almost exactly in the area where *D. waigeoensis* sp. nov. occurs. Further research is required to clarify the distribution of this species and highlight the population size and trend. It is also important to clarify does *D. waigeoensis* sp. nov. occurs all over Waigeo or is limited to southern part of it.

Moussonia O. Semper, 1865

Type species: *Pupa problematica* Mousson, 1865 (original designation)

Diagnosis: Shell elongate conical, dextral, oval, non-umbilicate. Protoconch whorls are smooth to finely microgranulate. Teleoconch whorls are keeled (on periphery) or rounded. Shell is smooth to finely ribbed. The ultimate whorl narrowed or not narrowed. The inner peristome forms polished callus which is at least briefly discontinued by the columellar denticle. The columellaris ends in a distinct columellar denticle at a central to basal position in the aperture. Internal lamellae include one columellaris, two parietals and one or two palatals (with some exceptions, see Table 9). The operculum is






oval or semicircular, transparent, and very thin and flexible with a calcareous plate which lacks ridges.
Remark: This genus is quite polymorphic and aberrant in certain conchological characters (e.g. axial ribs and shell shape).

Distribution: Borneo, Moluccan Islands, New Guinea with satellite islands, Fiji Islands, Samoa Islands.
Diversity in the study area: Twelve species hitherto confirmed (Table 9).

Table 9. Characters matrix 4. Genus *Moussonia* O. Semper.

Legends: + present; – absent; ? – unknown; r = axial ribs on the penultimate whorl straight (1) or humped (2); rp = axial ribs in form of delicate striation (0), ribbing pattern widely-spaced throughout the teleoconch (1) or dense (2); s = axial ribs provided with setae; pr = peristomal rim; u = umbilicus open (+) or closed (-); pt = number of palatalis; prt = number of parietalis; ck = columella provided with knob (+) on simple (-); d = dextral or ss = sinistroid.

Taxon \ Character	r	rp	s	u	pr	pt	prt	ck	d / ss
Moussonia ahena	2	2	-	-	-	?	?	?	d
Moussonia echinata	2	2	+	-	-	?	?	?	d
Moussonia hirsuta	2	2	+	-	-	?	?	?	d
Moussonia hyponepia	2	1	-	-	+	?	?	?	d
Moussonia manuselae	2	2	+	+	-	?	?	?	d
Moussonia monstrificabilis	1	2	-	-	+	0	0	-	ss
Moussonia omias	2	2	-	-	+	?	?	?	d
Moussonia papuana	2	2	-	-	+	0	1	+	d
Moussonia pseudoseparanda	2	2	-	-	+	1	1	-	d
Moussonia separanda	2	2	-	-	+	1	2	-	d
Moussonia strubelli	2	2		-	-	?	?	-	d
Moussonia torricelli	0	2	-	-	+	1	2	-	d

***Moussonia ahena* (Preston, 1913)** (Plate 27 figs 12-16, map 6)

Lectotype BMNH [herewith designated]: (Moussonia) ahena [written like "akena"] Preston. Diplommatina Type lsd. of Beilan, Beilan Dutch. E. Indies. [handwritten] / Type. [printed] / ahena Preston. Dutch. E. Indies. Dipl. 1914.1.7.460. [handwritten].
Paralectotype MHUB [herewith designated]: Zoolog. Museum Berlin. [printed, underlined] Moussonia ahena Prest. lsd. of Beilan-Beilan Moluccen [sic!] 63795. Preston [handwritten] / 63795. [handwritten]. Another paralectotype in SMF (specimen No 105169).

Lectotype designation: Syntypic specimen from BMNH was selected as lectotype.
References: Preston (1913: 439); Zilch (1953: 39, pl. 13 fig. 198), as *Diplommatina (Moussonia) ahena*.
Measurements: Lectotype H = 2.7 mm, D = 1.2 mm, HW = 1 mm, PD = 0.8 mm. Paralectotype from MHUB H = 2.7 mm, D = 1.2 mm, HW = 1 mm, PD = 0.8 mm.
Description: Shell is very small, brown coloured, dextral, narrowly conical. Shell with 8 rather flat whorls with obtuse peripheral carina. The 1½ embryonic whorl is microscopically pitted. The suture is moderately deeply impressed. The ultimate whorl is as wide as the penultimate whorl in apertural view. The constriction is not delimited on shell wall. The teleoconch is sculptured with coarse, dense, and humped axial ribs. The ribs are equally dense on all whorls. There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those of the previous whorls and are strongly oblique to the coiling axis. Spiral striae are not visible at 80x magnification. The aperture is tilted about 20-25° to the coiling axis and is circular and has entire apertural rim. The aperture is shifted right against the coiling axis in apertural view. The peristome is distinctly double, all its margins are not sinuous. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a continuous polished callus. One large columellar denticle directed downwards. No specimens were available to study the internal lamellae. Operculum is unknown.
Ecology: Unknown. Belangbelang Island is covered by primary lowland rainforest on limestone soil.
Distribution: Southernmost North Moluccas: Belangbelang Island of Obi Islands group. Almost certainly should be present on other islands of Obi group, particularly on limestone Obilatu Island.
Conservation status: Data Deficient, DD. *Moussonia ahena* is known by type specimens sampled over 100 years ago from single locality. Therefore not enough data available to calculate current EOO and AOO. The area of Belangbelang Island is 7 km^2. The total area of all Obi Islands is about 5100 km^2.






It is very unlikely *M. ahena* occurs all over Obi Islands (especially not on distant Gomumu and Tobalai). Moreover, only small fractions of Obi rainforests are located on limestone soils. Consequently, the maximum EOO for this species estimated below 5000 km^2. The main threat for this species is loss of the habitat (lowland rainforest on limestone), but this to be confirmed. Belangbelang Island is uninhabited, but all neighbouring islands (small Bisa, Obilatu, Tapat and large Obira) are inhabited. The area covered by rainforest on Obi Islands is decreasing. Between 2001 and 2014 about 11000 ha of the rainforest were lost (calculated for canopy density over 25% according to the Global Forest Watch (2016)). This trend is likely to continue taking into account the growing human population on the Moluccas and presence of the large nickel mine in W Obira (attracting additional workers from other regions of Indonesia). Additional research on Obira Island carried out by the Florida Museum of Natural History (2008), as well as extensive search on Bisa and Obira islands (by the Entomological Society of Latvia, 2011 & 2013) gave no results for this species. The population of *M. ahena* is likely not rich or geographically restricted to limestone islands. Further research is required on Belangbelang to clarify the population size and trend. Search for *M. ahena* population to be performed also on Obilatu, Tapat, as well as on Obira.

***Moussonia echinata* sp. nov.** (Plate 27 figs 20-22, map 22)

http://zoobank.org/5A08EB55-B69F-48F8-A699-6F9B607C3E3F

Holotype NME: INDONESIA E, West Papua, S Bird's Neck, Kaimana 40 km E, Triton bay, Lobo vill. & env., 3°45'33"S, 134°06'11"E, 15-150 m, 11-12.IX.2010, primary rainforest on limestone, leg. K.Greķe.

Derivatio nominis: Named from the Latin 'echinatus' [bristly, spiny], because of the extraordinarily setose shell.

Measurements: Holotype H = 2.2 mm, D = 1.1 mm, HW = 0.8 mm, PD = 0.8 mm.

Description: Shell is small, pale brown, dextral, and narrowly conical. Shell with 7 rather flat whorls with obtuse peripheral carina, the 2 embryonic whorls are microscopically pitted. Suture deeply impressed. The ultimate whorl is as wide as the penultimate whorl in apertural view. The constriction is not delimited on shell wall. The teleoconch is sculptured with membranous, dense, and humped axial ribs. These ribs are equally dense on all whorls. The peripheral carina of teleoconch whorls is covered with long membranous setae derived from the axial ribs. There are no abrupt changes in ribbing pattern. The ribs are partly synchronized with those on the previous whorls. The ribs are strongly oblique to the coiling axis. Spiral striae are only vaguely indicated on the last half of the ultimate whorl. The aperture is tilted about 25° against the coiling axis. The circular peristome is discontinued at the insertion of the columellar denticle. The aperture is shifted right against the coiling axis in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is double and consists of several dense lamellae in lateral view. The inner peristome forms a broad continuous polished callus. Both the inner and outer peristomes are not or only slightly sinuous. One large columellar denticle directed downwards. Because only one specimen was available for study, I did not damage the shell to observe the internal lamellae which remain unknown for this species. Operculum is unknown.

Differential diagnosis: Due to its setose shell *Moussonia echinata* sp. nov. is similar to *M. hirsuta* (Zilch, 1953) (Central Moluccas), *M. manuselae* sp. nov. (Central Moluccas; see description of this species below) and *M. strubelli* (O. Boettger, 1891) (Central Moluccas). Shells of both *M. manuselae* sp. nov. and *M. strubelli* bear rectangular microsculpture. Both species have shells of 8 whorls. The most similar species to *M. echinata* sp. nov. is *M. hirsuta* which is significantly larger (3.6 mm shell height in *M. hirsuta* compared to 2.2 mm in *M. echinata* sp. nov.), *M. hirsuta* has 8 whorls (compared to 7 whorls in *M. echinata* sp. nov.) and the second obtuse carina is present on the base of the last whorl in *M. hirsuta* (in *M echinata* sp. nov. only one carina present).

Ecology: Found in leaf litter of primary lowland rainforest on limestone soil.

Distribution: New Guinea: Bird's Neck isthmus.

Conservation status: Data Deficient, DD. *Moussonia echinata* sp. nov. is known from a single specimen. Not enough data available to calculate current EOO and AOO. Population size and trend are unknown, as well as threats. Further research is required to gather this basic information.

***Moussonia hirsuta* (Zilch, 1953)** (Plate 27 figs 17-19)

Holotype SMF: Dipl. (Moussonia) hirsuta Fult. xx Buru [handwritten, label yellow] / Senckenbg.Mus. [printed] 105173/1 [handwritten] Frankfurt.-M. [printed] Diplommatina (Moussonia) hirsuta (Fulton) [underlined] Z. Holotypus Molukken: Insel Buru Fulton d. [handwritten] Sammlung O.v.Moellendorff [printed].






References: Fulton (1899: 213), as *Diplommatina Strubelli*, Bttg.; van Benthem Jutting (1927: 4), as *Diplommatina strubelli* Böttg.; Zilch (1953: 39, pl. 13 fig. 197).
Measurements: Holotype H = 3.6 mm, D = 1.6 mm, HW = 1.5 mm, PD = 1.3 mm.
Description: Shell is large, brown, dextral, narrowly conical. Shell with 8 rather flat whorls with obtuse peripheral carina, the 2 embryonic whorls are microscopically pitted. The suture is deeply impressed. The ultimate whorl is as wide as the penultimate whorl in apertural view. The constriction is not delimited on shell wall. The teleoconch is sculptured with membranous dense and humped axial ribs. The ribs are almost equally dense on all whorls. There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those of the previous whorls and are strongly oblique to the coiling axis. Spiral striae are distinct but poorly visible from between the ribs. The peripheral carina of teleoconch whorls is covered with long membranous setae derived from the axial ribs. The second, rather inconspicuous obtuse carina is situated on the base of the ultimate whorl. The aperture is tilted about 20-25° to the coiling axis and is circular. The apertural rim is discontinued at the insertion of the columellar denticle. The aperture is more or less strongly shifted right against the coiling axis in apertural view. The peristome is double, margins of the peristome are not sinuous. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms narrow continuous polished callus. One large columellar denticle directed downwards. No specimens were available to study the internal lamellae. Operculum is unknown.
Ecology: Unknown. Buru Island was initially covered by lowland to mid montane rainforest.
Distribution: Central Moluccas: Buru Island. Exact locality is unknown, therefore a distribution map is not given.
Conservation status: Data Deficient, DD. *Moussonia hirsuta* is known from a single specimen collected over 100 years ago. This species has not been collected again. Not enough data available to calculate current EOO and AOO. Further research is required to gather this basic information.

***Moussonia hyponepia* (van Benthem Jutting, 1958) comb. nov.** (Plate 28 figs 1-3, map 16)
Holotype NMNL: Misoöl, Waima, 0-75 m Lieftinck, M.A. 1948.09.10 [printed] / ZMA.MOLL.135954 [printed] / Diplommatina Moussonia hyponepia Van Benthem Jutting, 1958 [printed].
Paratypes 5 specimens NMNL: not studied.

References: van Benthem Jutting (1958a: 296, 321), as *Diplommatina (Moussonia) hyponepia*.
Measurements: Holotype: H = 1 mm, D = 0.8 mm, HW = 0.45 mm, PD = 0.4 mm. Selected paratypic specimens (according to the original description): H = 1 mm, D = 0.8 mm, PD = 0.5 mm; H = 0.9 mm, D = 0.8 mm, PD = 0.5 mm.
Description: Shell is very small, brown to pale-brown, dextral, short conical. Shell with 6 convex whorls with inconspicuous peripheral carina, the 2 embryonic whorls are microscopically pitted. The suture is moderately deeply impressed. The ultimate whorl is as wide or almost as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is not delimited on shell wall. The teleoconch is sculptured with fine, widely-spaced, indistinctly humped axial ribs. The ribs are equally dense on all whorls, but becoming more widely-spaced on the last half whorl. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. Spiral striae are lacking. The aperture is tilted about 35-40° to the coiling axis and is circular. The apertural rim discontinued at the insertion of the columellar denticle. The aperture is more or less centered below the penultimate whorl in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is double, broad in lateral view, all margins of the peristome are not sinuous. The inner peristome forms a polished callus which is discontinued near the columellar / parietal junction. The outer peristome is discontinued on the columellar side. A strong peristomal rim is present. There is one large columellar denticle, it is directed downwards. No specimens were available to study the internal lamellae. Operculum is unknown.
Ecology: Unknown. Misool Island is covered by primary lowland rainforest on limestone soils.
Distribution: Raja Ampat Islands: Misool Island.
Conservation status: Data Deficient, DD. *Moussonia hyponepia* is known from type series collected over 60 years ago in NW Misool. Not enough data available to calculate current EOO and AOO. The maximum EOO estimated about 1100 km^2 taking into account the area of northern and central Misool (*M. hyponepia* was not found in S and E Misool despite intense research performed in 2009 and 2012 by the Entomological Society of Latvia expeditions). The maximum AOO estimated higher but definitively under 500 km^2. The population size and






trend are unknown. The main threat for this species is unknown. Misool Island is still very forested and human population is comparatively small even despite continuous growth. Further research is required in order to clarify status of this species in the wild, assess its distribution, population size, trends and highlight threats.

***Moussonia manuselae* sp. nov.** (Fig. 25, plate 28 figs 4-6, map 7)
http://zoobank.org/3C8DDE52-0E7F-46ED-95B4-20DB22DACAFD
Holotype NME: INDONESIA E, Prov. Maluku tengah, Seram N, distr. Seram Utara, Trans-Seram road between Masohi and Sawai, Horale (former Saka) vill. ~7 km SW, river valley, 02°59'15"S, 129°02'37"E, 07.IV.2009, primary lowland rainforest, leaf litter, leg. K.Greķe.
Paratypes: 1 adult KGC: same label as holotype; 1 adult & 4 juv. LKCNHM: ZRC.1999.2415 [handwritten] / Coll. J.J. Vermeulen, nr. 5302 Diplommatina hirsuta Zilch 1953 - Diplomm. * [printed] ZRC.1999.2415 5 nos. (1 broken) [handwritten] INDONESIA. Ceram, central part, above Moso. Rock overhang in forest. Alt. 600 m asl. Leg. A.J. Whitten, 1996. [printed] / ZOOLOGICAL REFERENCE COLLECTION DEPARTMENT OF ZOOLOGY NATIONAL UNIVERSITY OF SINGAPORE [printed] Diplommatinidae ZRC.MOL.10457 Ex [handwritten] ZRC. [printed] 199.2415 [handwritten] No. Spec. [printed] 5 nos. (1 broken) [handwritten] Species. [printed] Diplommatina hirsuta ZILCH, 1953 [handwritten] Locality [printed] Indonesia, Ceram, central part, above Moso. AH. 600 m asl [handwritten] Collector [printed] A J Whitten [handwritten] Date [printed] 1996 [handwritten] Det. by [printed] JJ Vermeulen, nr. 5302 [handwritten] Date [printed].

Derivatio nominis: Toponymic. The name derives from Manusela, Seram's famous central ridge reaching over 3000 m altitude.
Measurements: Holotype H = 2.8 mm, D = 1.5 mm, HW = 1.45 mm, PD = 1.1 mm. Paratypic specimen from locus typicus H = 2.85 mm, D = 1.55 mm, HW = 1.45 mm, PD = 1.1 mm.
Description: Shell is small, dark brown, dextral, and conical. Shell with 7-7$^{1}/_{4}$ rather flat whorls with obtuse peripheral carina, the 2 embryonic whorls are microscopically pitted. The suture is broad and very deeply, cavity-like impressed (best viewed with shell pubescence removed). The ultimate whorl is as wide as or slightly wider than the penultimate whorl in apertural view. The constriction is not delimited on shell wall. The teleoconch is sculptured with membranous, dense and humped axial ribs. There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those of the previous whorls and are almost equally dense on all whorls. The ribs are strongly oblique to the coiling axis. The peripheral carina of the teleoconch is covered with long membranous setae derived from the axial ribs. Spiral striae strong and dense, strongly wavy on lower part of the ribs. A network of conspicuous impressed, irregularly rectangular cells is developed between the spiral and axial sculpture. The aperture is tilted about 40° to the coiling axis and is circular. The apertural rim discontinued at the insertion of columellar denticle. The aperture is shifted right against the coiling axis in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is double. The palatal margins of both peristomes are slightly sinuous. The inner peristome forms a narrow continuous polished callus. There is one flat and obtuse transverse parietalis. One large round columellar denticle is directed downwards. The columella is very broad, obliquely twisted, forms a broad obtuse horizontal columellaris in its basal third. Operculum is unknown.
Differential diagnosis: Due to its setose shell *Moussonia manuselae* sp. nov. is similar to *M. echinata* sp. nov. (Bird's Neck Isthmus of New Guinea; see description of this species above), *M. hirsuta* (Zilch, 1953) and *M. strubelli* (O. Boettger, 1891) (last two from Central Moluccas). The new species differs specifically in less slender shell and presence of strong rectangular sculpture on the teleoconch (in *M. strubelli* similar sculpture is present but is less conspicuous). Supposedly non-setose *M. papuana* (Tapparone Canefri, 1883) (Aru Islands) differs due to the absence of the rectangular shell sculpture and in different columellaris. The most similar *M. echinata* sp. nov. is smaller (shell height 2.2 mm) and slender, has delicately spirally striate teleoconch whorls (spiral striae are distinct and dense in *M. manuselae* sp. nov.) and the peristome consists of several dense lamellae in *M. echinata* sp. nov. (the peristome consists of two lamellae in *M. manuselae* sp. nov.). *M. hirsuta* (Zilch, 1953) (Central Moluccas) is one whorl bigger and has different spiral structure.
Ecology: Specimens were sampled from underside of leaf litter in a ravine rainforest and at base of rock formations.
Distribution: Central Moluccas: Seram Island.
Conservation status: Data Deficient, DD. *Moussonia manuselae* sp. nov. is known from two localities. Not enough data available to calculate current EOO. The maximum EOO for this species is 17000 km^2 taking into account the area of Seram Island. The current AOO is 8 km^2. The maximum AOO for this species estimated over 500 km^2 taking into account available habitat. The population size and






trend as well as the main threat remain unknown. Further research is required to gather this basic information.

***Moussonia monstrificabilis* sp. nov.** (Figs 108-109, plate 29 figs 1-8, map 16)

http://zoobank.org/91DD77C2-3FA4-46B1-9CEE-7FACA685A217

Holotype NME: INDONESIA E, Raja Ampat, Misool Island (central), River Gam upstream, Gamta vill. 12-14 km NW, 01°57'50"S, 130°11'09"E, 70-350 m, 04-06.II.2012, primary lowland rainforest on limestone, leg. D.Telnov.

Paratypes 4 adults & 2 juv. NME, 10 adults, 1 subadult & 2 juv. KGC: same label as holotype.

Derivatio nominis: Named from Latin "monstrificabilis" [outlandish, rarity, strange], because of unique twist of the shell with apex and aperture juxtaposed in same spot.

Measurements: Holotype H = 2.05 mm, D = 1.35 mm, HW = 1.75 mm, PD = 1 mm. Selected paratypic specimen: H = 2.3 mm, D = 1.45 mm, HW = 1.2 mm, PD = 1.2 mm.

Description: Shell is small, brown, cylindrical and sinistroid. Shell with 7 whorls, the outer whorls are strongly convex. The five earliest whorls are dextral, only slightly convex, forming a broadly triangular shell with a flattened apex. During the 5th whorl, shell coiling reverses direction, the final 2-3 whorls form a sinistral tuba on an otherwise dextral shell. The tuba completely overgrows the initial dextral shell and the aperture is deposited on top of the dextral shell apex. The suture is moderately deeply impressed. The ultimate whorl is strongly constricted at the aperture. The pseudoumbilicus is open and perspective in the adult. The constriction is not delimited on shell wall. Teleoconch is sculptured with delicate and dense axial striations. There are no abrupt changes in the striation pattern. The ribs are not synchronized with those of previous whorls and are straight on the first 5 whorls becoming oblique after coiling reversal. Spiral striae are quite prominent and dense on all teleoconch whorls, the inner and the outer ones. There is a very dense sculpture of delicate axial striae between the ribs - about 7-9 axial striae per 20 µm. Spiral striae are very peculiar, strong and dense with impressed spaces between ribs (building cellular structure - see Figs 108-109). The aperture is tilted about 20° against the coiling axis. The circular peristomal rim is discontinued on the columellar side at the insertion of the columellar denticle. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is simple, moderately broad, discontinued at the insertion of the columellar denticle. The peristomal rim is reinforced by a strong and broad labial callus. The parietal margin of the aperture is pressed against the shell wall. The margins of the peristome are not sinuous. The peristome forms a broad polished and continuous callus. On the third whorl an acute peripheral carina develops, becoming stronger (broader) towards the first whorl and is finally visible in the aperture in a form of a large upwards directed columellar denticle (consider right shell position - see Plate 29 figs 5-7). The carina is not visible on the outer shell wall, but on the inner one (outer wall removed to see the carina). Operculum is unknown.

Differential diagnosis: No similar species are known within the family. This species is peculiar primarily due to the specific shell microsculpture and sinistroid shell. Therefore *Moussonia* is the second sinistroid genus of molluscs.

Phylogeny: A result of COI analysis for this species is unique for the available Bayesian tree of the Diplommatinidae (Clark et al. 2016). This species together with *Moussonia separanda* sp. nov. (see description of this species below) are representing a distinct and very separate clade far beyond the Cochlostomatidae, Cyclophoridae and Megalostomatidae as proposed by Webster et al. (2012). The hypothesis of the Diplommatinidae being polyphyletic is being therefore highlighted again. Thus, many Diplommatinidae taxa to be reassessed both anatomically and genetically as well as more numerous DNA analysis required for another caenogastropod groups prior any conclusions will be made (consider chapter "Phylogeny").

Ecology: Specimens were sampled in primary lowland rainforests on limestone anticlines, at altitudes 70-350 m.

Distribution: Raja Ampat Islands: Misool Island.

Conservation status: Least Concern, LC. The current EOO is about 6 km^2. The maximum EOO estimated less than 2000 km^2 taking into account the area of Misool Island and available habitat. The current AOO is 4 km^2 . However, the real AOO is likely much higher. No data available on the population size and trend. *Moussonia monstrificabilis* sp. nov. is not a common species. This species is currently known from one locality. No major threats to this species have been identified. Misool Island is still very pristine and covered by primary rainforests for over 75%. However, human population is growing and local development is ongoing because of the establishment of new administrative division on Misool in order to attract government fundings.



Hitherto no large scale deforestation is recorded on Misool, but some areas (for example in the SE near Lilinta vill.) suffered from small-scale illegal logging over a decade ago. Significant decline in EOO, AOO or quality of habitat cannot be projected for this species within next 10 years. Further research is required on the distribution of this species as well as on threats to it.

***Moussonia omias* (van Benthem Jutting, 1958) comb. nov.** (Plate 28 figs 7-9, map 16)

Holotype NMNL: Misoöl, Waima, 0-75 m Lieftinck, M.A. 1948.09.10 [printed] /ZMA.MOLL.135959 [printed] / Diplommatina omias Van Benthem Jutting, 1958 [printed].
Paratypes 52 NMNL: same labels as holotype.

References: van Benthem Jutting (1958a: 296, 319), as *Diplommatina (Moussonia) omias*.
Measurements: Holotype H = 2.8 mm, D = 1.4 mm, HW = 1.3 mm, PD = 1 mm. Selected paratypic specimens (according to the original description): H = 2.4 mm, D = 1.3 mm, PD = 0.9 mm; H = 2.9 mm, D = 1.4 mm, PD = 1 mm; H = 2.6 mm, D = 1.3 mm, PD = 0.8 mm.
Description: Shell is small, brown to reddish-brown, dextral and short conical. Shell with 7 somewhat convex whorls with inconspicuous peripheral carina, the 2 embryonic whorls are microscopically pitted. The suture is deeply impressed. The ultimate whorl is as wide or almost as wide as the penultimate whorl in apertural view. The constriction is not delimited on shell wall. The teleoconch is sculptured with fine, dense, and indistinctly humped axial ribs. The ribs are equally dense on all whorls, but becoming more widely-spaced on the last half whorl. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are strongly oblique to the coiling axis. Spiral striae are lacking. The aperture is tilted about 35-40° to the coiling axis and is circular. The apertural rim discontinued at the insertion of the columellar denticle. The aperture is shifted right against the coiling axis or slightly shifted right in apertural view. The parietal margin of the aperture is not fully attached to the ultimate whorl. The peristome is double, broad in lateral view. Peristomal margins are not sinuous and are discontinued on the columellar side. The inner peristome forms a continuous polished callus. A strong peristomal rim is present. One large columellar denticle directed downwards. No specimens were available to study the internal lamellae. Operculum is unknown.
Ecology: Unknown. Misool Island is covered by primary lowland rainforests on limestone soils.
Distribution: Raja Ampat Islands: Misool Island.
Conservation status: Data Deficient, DD. *Moussonia omias* is known from type series sampled over 65 years ago from three localities in NW Misool Island. This species has not been collected again. Not enough data available to calculate current EOO and AOO. The maximum EOO estimated 1100 km^2 taking into account the area of northern and central Misool (this species was not found in the South and East of Misool despite intense research in 2009 and 2012 by the expeditions of the Entomological Society of Latvia). The maximum AOO is definitively below the threshold of 500 km^2. The population size and trend are unknown, but *M. omias* was locally abundant. The main threat for this species cannot be identified. Misool Island is still forested for over 75% and human population is small despite continuous growth. Further research is required on the distribution, population size as well as on threats for *M. omias*.

***Moussonia papuana* (Tapparone Canefri, 1883)** (Figs. 26-27, plate 28 figs 10-13)

Lectotype MSNG: Museo Civico di Storia Natur. di Genova Molluschi della Nova Guinea [printed] 273 [handwriten] . Coll. O. Beccari [printed] Moussonia Papuana Tapparone Canefri [handwritten] Ann.Mus.Civ. Genova [printed] XIX [handwritten] p. [printed] 269 Wokan [sic!], is. Aru [handwritten] / Museo Civico di Storia Naturale di Genova [printed] Moussonia papuana Tapp. Ann.M.G. XIX, 1883, p. 269, t. X, f. 16-17. Typus! Is. Aru: Vokan [sic!], 1873. O.Beccari! [handwritten] / HOLOTYPE [printed] / ICONOTYPE [printed].
Paralectotypes 26 adults: 23 adults MSNG: Museo Civico di Storia Natur. di Genova Molluschi della Nova Guinea [printed] 273 [handwriten] Coll. O. Beccari [printed] Moussonia Papuana Tapparone Canefri [handwritten] Ann.Mus.Civ.Genova [printed] XIX [handwritten] p. [printed] 269 Wokan [sic!], is. Aru [handwritten] / Museo Civico di Storia Naturale di Genova [printed] Moussonia papuana Tapp. Ann.M.G. XIX, 1883, p. 269, t. X, f. 16-17. Typus! Is. Aru: Vokan [sic!], 1873. O.Beccari! [handwritten] / PARATYPEN [printed]; 3 adults FMNH: 118376 [printed] / 118376 FIELD MUSEUM OF NATURAL HISTORY MOLLUSCA: DIPLOMMATINIDAE 3 dry specs. Paralectotype(s): Moussonia papuana Tapparone Canefri, 1883 Sta. OB-118376, Indonesia, Moluccas, Aru Islands, Wokan O. Beccari! Ex Museo Civico di Storia Naturale di Genova 'Giacomo Doria' (Acc.# 14301) [printed].

References: Tapparone Canefri (1883: 269, pl. 10 figs 16-17); Kobelt (1886: 174); Kobelt & von Möllendorff (1898: 142), checklist, as *Diplommatina* subgen. *Moussonia papuana*; Kobelt (1902: 420), as *Diplommatina (Moussonia) papuana*;






Boettger C.R. (1922: 359, 362, 402, pl. 22 fig. 35); van Benthem Jutting (1953: 288, 312), as *Diplommatina papuana*; Zilch (1953: 39), as *Diplommatina (Moussonia) papuana*; van Benthem Jutting (1962: 10), as *Moussonia papuana (Diplommatina papuana)*, lectotype designation; van Benthem Jutting (1963: 711), as *Diplommatina papuana*; Vermeulen (1996c: 112), as *Diplommatina papuana*; Monk et al. (1997: 395), as *Diplommatina papuana*; Egorov (2013: 21, fig. 34b), as *Diplommatina (Moussonia) papuana*.

Measurements: Lectotype H = 2.2 mm, D = 1.1 mm, HW = 0.95 mm, PD = 0.75 mm. Selected paralectotypes: H = 2.1 mm, D = 1.1 mm, PD = 0.7 mm; H = 1.9 mm, D = 1 mm, PD = 0.7 mm.

Description: Shell is very small, brownish, dextral and narrowly conical. Shell with 7 convex whorls with obtuse peripheral carina, the 1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is slightly narrower than the penultimate whorl in apertural view. The constriction is not delimited on shell wall. The teleoconch is sculptured with coarse, dense, humped axial ribs. The ribs are equally dense on all whorls. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. Spiral striae are lacking. The aperture is tilted about 30-40° to the coiling axis and is circular. The apertural rim discontinued at the insertion of the columellar denticle. The aperture is shifted right against the coiling axis in apertural view. The peristome is double. The margins of the peristome are not sinuous. The parietal margin of the peristome is not fully attached to the ultimate whorl. The inner peristome forms polished callus which is discontinued at the insertion of columellar denticle. There is one short high and acute parietalis. The columella is broad, obliquely twisted, forming a broad and umbrella-like columellaris in its basal third. One large columellar denticle directed downwards. Operculum is unknown.

Ecology: Unknown. Tanahbesar Island is covered with primary lowland rainforests on limestone soils.

Distribution: Aru Islands: Tanahbesar (= Wokam) Island, possible also another islands of Aru group. Record from Ambon Island in Central Moluccas (van Benthem Jutting 1953) is supposedly based on misidentified specimen which has not been available for this study. Exact locality is unknown, therefore a distribution map is not given.

Conservation status: Data Deficient, DD. *Moussonia papuana* is known from type series sampled over 100 years ago from single locality. Not enough data available to calculate current EOO and AOO. The area of Tanahbesar Island is ~1600 km^2 but the total land area of Aru Islands is about 6270 km^2. It is very unlikely *M. papuana* occurs all over Aru Islands (particularly not on southern part of Tarangan (= Trangan) Island which is known by its savannah-like vegetation). Consequently, the maximum EOO for this species estimated 9800 km^2 (including numerous small islands adjacent to Aru). The main threat is unknown. The area of Aru Islands covered by rainforests is slowly decreasing, between 2001 and 2014 about 7500 ha of the rainforest were lost (calculated for canopy density over 25% according to the Global Forest Watch (2016)). Present human population is small but it is also increasing. Additional research is needed to clarify status of this species in the wild, assess its population size as well as highlight threats.

***Moussonia pseudoseparanda* sp. nov.** (Figs 28-30, plate 29 figs 9-12, map 24)

http://zoobank.org/0F56CE0F-AEA5-4ED1-AF0C-B823585CF89F

Holotype NME: INDONESIA E, West PAPUA, Onin Peninsula, Fak-Fak 10 km E, 2°56'32"S, 132°23'01"E, Sakarteman vill. 1-4 km W, River Sakarteman valley, 350-450 m, 26.IX.2010, primary lowland rainforest on limestone, leg. K.Greķe.

Derivatio nominis: Named from the combination of Latin "pseudo" + "separandus" [separated], because of strong similarity in shell shape and structure with *Moussonia separanda* sp. nov. (see description of this species below).

Measurements: Holotype H = 2.3 mm, D = 1.45 mm, HW = 1.2 mm, PD = 1.2 mm.

Description: Shell is small, dextral, broadly conical with flattened apex, coloured brown on early whorls and pale brown on the last two whorls. Shell with $6^2/_3$ whorls, early ones are rather flat but younger ones - convex. The 2 embryonic whorls are microscopically pitted. The suture is moderately deeply impressed. The ultimate whorl is constricted; it is as wide as the penultimate whorl in apertural view. The constriction is not delimited on shell wall. The teleoconch is sculptured with very delicate and very dense axial striation. There are no abrupt changes of the striation pattern. The ribs are not synchronized with those of the previous whorls and are strongly oblique to the coiling axis. Spiral striae are very delicate and dense, poorly visible at 200x magnification. The aperture is tilted about 30° to the coiling axis and is ovoid. The apertural rim is broadly discontinued at the insertion of columel-







lar denticle. The aperture is more or less centered below the penultimate whorl in apertural view. The parietal margin of the aperture attached to the ultimate whorl. The peristome is simple, moderately broad in lateral view. A peristomal rim is situated close to the peristome and is reinforced by a strong and broad labial callus. The palatal and the basal margins are sinuous. The peristome forms rather narrow polished callus which is discontinued at the insertion of columellar denticle. There is one very strong acute and high parietalis ending at the columella. There is one flat palatalis situated over the columellar denticle. There is One large columellar denticle directed downwards. The columella is broad, strongly twisted, forming a broad umbrella-like oblique columellaris in its basal third. The columellaris increases in width towards the shell interior and is provided with a large flat knob which is directed upwards (Figs 28-29). The operculum is primitive - semicircular, very thin and transparent with a few concentric lines.

Differential diagnosis: Very conspicuous species primarily due to the specific shell shape. Conchologically very similar to *Moussonia separanda* sp. nov. (Misool Island; see description of this species below) but differs specifically in having simple parietalis (parietalis Y-like, merging from two teeth in *M. separanda* sp. nov.), the palatalis being shorter and less conspicuous compared with the pt in *M. separanda* sp. nov. and in presence of the conspicuous upwards-directed knob in the interior of the twisted columellaris (this knob is less conspicuous and more or less horizontal in *M. separanda* sp. nov.).

Ecology: Specimen was sampled in primary lowland rainforest on limestone at altitude 350-450 m.

Distribution: West New Guinea: Onin Peninsula.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO. The maximum EOO for this species also cannot be projected. The current AOO is 4 km^2, but the maximum AOO is likely higher. The population size and trend are unknown. The main threat for this species cannot be identified. Since this species is known from lowland areas it is likely endangered by ongoing decline in primary rainforests. Further research is required in order to clarify species distribution, population size, trends and highlight threats.

***Moussonia separanda* sp. nov.** (Figs 31-34, 110, plate 30 figs 1-9, map 17)

http://zoobank.org/9C9B6A95-4FF4-42C4-8063-2641203FC651

Holotype NME: INDONESIA E, Raja Ampat, Misool Island (central), River Gam upstream, Gamta vill. 12-14 km NW, 01°57'50"S, 130°11'09"E, 350 m, 06.II.2012, primary lowland rainforest on limestone, leg. D.Telnov.

Paratypes 7 specimens: 2 adults NME & 2 adults KGC: same label as holotype; 3 adults KGC: INDONESIA E, Raja Ampat, Misool Island (central), River Gam upstream, Gamta vill. 12-14 km NW, 01°57'50"S, 130°11'09"E, 70-350 m, 04-06.II.2012, primary lowland rainforest on limestone, leg. D.Telnov; 1 adult KGC [collected dead]: INDONESIA E, Prov. Raja Ampat, distr. Misool Barat, Lilinta (Lelintah) vill. ~20 km SW, Yan Island, 02°07'53"S, 130°07'17"E, 02.IV.2009, primary coastal semidry vegetation, under rotten log, leg. K.Greķe [collected dead].

Derivatio nominis: Named from Latin "separandus" [separated], because of distant phylogenetic position of this species from another Diplommatinidae (see "Phylogeny" section below).

Measurements: Holotype H = 2.6 mm, D = 1.6 mm, HW = 1.5 mm, PD = 1 mm. Selected paratypic specimens: H = 2.6 mm, D = 1.5 mm, HW = 1.3 mm, PD = 1 mm; H = 2.5 mm, D = 1.5 mm, HW = 1.45 mm, PD = 0.95 mm.

Description: Shell is small, dextral, broadly conical with flattened apex, reddish brown coloured on early whorls, yellowish brown on younger ones. Shell with 7 whorls, older ones are rather flat but younger ones are convex. The 1½ embryonic whorl is microscopically pitted. The suture is moderately deeply impressed. The ultimate whorl is constricted, as wide as the penultimate whorl in apertural view. The constriction is not delimited on shell wall. The teleoconch is sculptured with very delicate and very dense axial striation. There are no abrupt changes of the striation pattern. The ribs are not synchronized with those of the previous whorls and are strongly oblique to the coiling axis. Spiral striae are very delicate and dense as visible at 200x magnification. The aperture is tilted about 30-35° to the coiling axis and is ovoid. The apertural rim is discontinued at the insertion of the columellar denticle. The aperture is more or less centered below the penultimate whorl in apertural view. The parietal margin of the aperture is attached to the ultimate whorl. The peristome is simple, moderately broad in lateral view. A peristomal rim is situated close to the peristome and is reinforced by a strong and broad labial callus. The peristome forms a broad continuous polished callus. The palatal and the basal margins of the peristome are sinuous. There are two rather flat parietalis which merge together and form one strong acute parietalis which is ending at the columella. There is one long palatalis situated over the parietal side of the peristome. One large columellar denticle directed downwards.






The columella is broad, strongly twisted, forms a broad and umbrella-like oblique columellaris in its basal third. The columellaris increases in width towards the shell interior and is provided with a large flat knob. The operculum is primitive - semicircular, very thin and transparent and with few concentric lines.

Differential diagnosis: See diagnose of *M. pseudoseparanda* sp. nov.

Phylogeny: A result of COI analysis for this species is unique for the available Bayesian tree of the Diplommatinidae (Clark et al. 2016). This species together with *Moussonia monstrificabilis* sp. nov. (see description of this species above) are representing a distinct and very separate clade far beyond the Cochlostomatidae, Cyclophoridae and Megalostomatidae as proposed by Webster et al. (2012).

Ecology: Specimens were sampled from under large fallen leaves on limestone anticlines in primary lowland rainforest at altitudes 70-350 m.

Distribution: Raja Ampat Islands: Misool Island.

Conservation status: Least Concern, LC. The current EOO is about 10 km^2 (since dead specimen of this species was found on shore of tiny and dry Yan islet, I consider this specimen was washed out from Misool forests rather than it also inhabits arid Yan islet where only bushy vegetation is present; therefore Yan is excluded from my EOO calculation). The maximum EOO estimated less than 2000 km^2 taking into account the area of central and southern Misool Island and available habitat (this species was not found on N and NW Misool). The current AOO is 8 km^2. The maximum AOO is definitively higher. There are no data available on the population size and trend. *Moussonia separanda* sp. nov. is not abundant. This species is currently known from two close-standing sites (again, Yan Island finding is not considered here). No threats to this species were identified. Misool Island is still very pristine and covered by primary rainforests for over 75%. However, human population is growing and local development is ongoing, especially because of establishing new administrative divisions on this island in order to attract government fundings. Hitherto no large scale deforestation recorded on Misool, but some areas (for example in the SE near Lilinta vill.) suffered from small-scale illegal logging over two decades ago. I cannot project any significant decline in the EOO, AOO or quality of the habitat within next 10 years. Further research is required on distribution of this species and on threats for its population.

***Moussonia strubelli* (O. Boettger, 1891)** (Plate 28 figs 14-16, map 8) nec *Diplommatina Strubelli* E.A. Smith, 1894

Holotype SMF: Dipl. (Moussonia) strubelli Bttg. Hitulama auf Hitu, N. Amboina ˣStrub. 91. [handwritten] / Senckenbg.Mus. [printed] 105170/1 [handwritten] Frankfurt.-M. [printed] Diplommatina (Moussonia) strubelli Bttgr. [underlined] Holotypus! Orig. 1891 T. 4 F: 3 N-Amboina: Hitulama auf Hitu A.Strubell 1891 [handwritten] Sammlung O.Boettger [printed].

Note: E.A. Smith (1894: 463) described *Diplommatina Strubelli* from Natuna Islands not being aware this name was already used by O. Boettger in 1891 (see note by E.A. Smith 1903).

References: O. Boettger (1891: 285, pl. 4 fig. 3), as *Diplommatina (Moussonia) Strubelli*; Kobelt & von Möllendorff (1898: 142), checklist, as *Diplommatina* subgen. *Moussonia Strubelli*; Kobelt (1902: 478), as *Diplommatina (Moussonia) Strubelli*; van Benthem Jutting (1953: 288, 312), as *Diplommatina strubelli*; Zilch (1953: 39); Monk et al. (1997: 395), as *Diplommatina strubelli*.

Measurements: Holotype H = 2.7 mm, D = 1.3 mm, HW = 1.2 mm, PD = 1.1 mm.

Description: Shell is large, dextral, narrowly conical, pale brown coloured. Shell with 7¼ convex whorls with rather acute peripheral carina, the 1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is as wide as the penultimate whorl in apertural view. The constriction is not delimited on shell wall. The teleoconch is sculptured with coarse, dense, humped axial ribs. The ribs are almost equally dense on all whorls but become more widely-spaced on the last half whorl. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. Spiral striae are dense but slightly visible from under the axial ribs. It consists of irregular poorly defined rectangular cells. The peripheral carina of teleoconch is provided with long membranous setae deriving from the axial ribs. The aperture is tilted about 30° to the coiling axis and is circular. The apertural rim is discontinued at the insertion of the columellar denticle. The aperture is shifted right against the coiling axis in apertural view. The peristome is double, the inner one is discontinued at the insertion of columellar denticle. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a polished callus on the palatal and the basal sides. The palatal margin of the outer peristome is sinuous. One large columellar denticle, directed slightly



downwards. No specimens were available to study the internal lamellae. Operculum is unknown.
Ecology: Unknown.
Distribution: Central Moluccas: Ambon Island. Records from Buru Island (Fulton 1899; van Benthem Jutting 1927) refer to *Moussonia hirsuta* (Zilch, 1953).
Conservation status: Data Deficient, DD. *Moussonia strubelli* is known from a single specimen collected over 100 years ago. Not enough data available to calculate current EOO and AOO. Further research is required to clarify status of this species in the wild, its distribution, population size, trend and define threats.

***Moussonia torricelli* sp. nov.** (Figs 35-36, plate 28 figs 17-21, map 23)
http://zoobank.org/59429A4C-73C5-45F0-8C65-A21B490DD015
Holotype UF (No 380574): UF 380574 Mollusca, Diplommatinidae 1 specimen(s) *Palaina* [printed] sp.4 [handwritten] Papua New Guinea, Sandaun Province Sinberien, base of S slope of Mount Sapau, 4 km NW of Parkop Village, 7 km NW of Sibilanga Mission wet hill forest along alkaline stream 526 meters -3.3975° 142.5288° Slapcinsky, J. 22 May 2005 JS-0798 dry FLORIDA MUSEUM OF NATURAL HISTORY [printed] / JS-798 „Palaina“ [handwritten].
Paratypes 14 specimens: 1 adult & 3 juv. UF: UF 380628 Mollusca, Diplommatinidae 5-spec. [sic! only one specimen available] *Palaina* Papua New Guinea, Sandaun Province Sindik, 0.3 km NW of Parkop Village, 3 km NW of Sibilanga Mission broadleaf tropical hill forest 426 meters -3.4232° 142.5213° Slapcinsky, J. 14 May 2005 JS-0793 75% ethanol FLORIDA MUSEUM OF NATURAL HISTORY [printed] / 793 [handwritten]; 1 adult & 2 juv. UF: UF 380586 Mollusca, Diplommatinidae 3 specimen(s) *Palaina* [printed] sp.4 [handwritten] Papua New Guinea, Sandaun Province Wayayane, 1 km N of Parkop Village, 4 km NW of Sibilanga Mission hill forest 565 meters -3.4194° 142.5269° Slapcinsky, J. 16 May 2005 JS-0794 dry FLORIDA MUSEUM OF NATURAL HISTORY [printed] / JS-794 „Palaina“ [handwritten]; 3 adults UF & 1 KGC: UF 380602 Mollusca, Diplommatinidae 4 specimen(s) *Palaina* [printed] sp. 4 [handwritten] Papua New Guinea, Sandaun Province Maibu, base of S slope of Mount Sapau, 4 km NW of Parkop Village, mature hill forest along river 550 meters -3.3945° 142.528° Slapcinsky, J. 23 May 2005 JS-0799 dry FLORIDA MUSEUM OF NATURAL HISTORY [printed] / Dipplomattinidae [sic!] JS-799 [handwritten]; 1 adult & 2 juv. UF: UF 380640 Mollusca, Diplommatinidae 3 specimen(s) *Palaina* [printed] sp.4 [handwritten] Papua New Guinea, Sandaun Province Smanmoke, base of S slope of Mount Sapau, 4 km NW of Parkop Village, mature hill forest along river 561 meters -3.3926° 142.5298° Slapcinsky, J. 24 May 2005 JS-0800 dry FLORIDA MUSEUM OF NATURAL HISTORY [printed] / JS-800 Palaina [handwritten]; 2 adult & 1 subadult UF: UF 380680 Mollusca, Diplommatinidae 3-spec. *Palaina* Papua New Guinea, Sandaun Province Smanmoke, base of S slope of Mount Sapau, 4 km NW of Parkop Village, mature hill forest along river 561 meters -3.3926° 142.5298° Slapcinsky, J. 24 May 2005 JS-0800 75& ethanol FLORIDA MUSEUM OF NATURAL HISTORY [printed] / brown dipplom. JS-800 [handwritten] [shells are dissolved in these specimens].

Derivatio nominis: Toponymic. This species is named after Torricelli Mountains in northern New Guinea where it was first found. Noun in apposition, invariable.
Measurements: Holotype H = 1.3 mm, D = 0.75 mm, HW = 0.6 mm, PD = 0.5 mm. Selected paratypic specimens: H = 1.3 mm, D = 0.75 mm, HW = 0.6 mm, PD = 0.5 mm; H = 1.3 mm, D = 0.7 mm, HW = 0.65 mm, PD = 0.5 mm.
Description: Shell is very small, reddish- to orange-brown, dextral, short conical with flattened apex. Shell with 6 convex whorls, the 2 embryonic whorls are microscopically pitted. The suture is deeply impressed. The ultimate whorl is as wide as the penultimate whorl in apertural view. The constriction is not delimited on shell wall. The teleoconch is sculptured with extremely delicate dense axial striation, poorly visible at 80x magnification. No abrupt changes of the striation pattern. Spiral striae are lacking. The aperture is tilted about 30° to the coiling axis, is narrowly oval. The apertural rim is entire. The aperture is slightly shifted right against the coiling axis in apertural view. The columellar side of the aperture is almost straight, the basal / columellar and the columellar / parietal junctions are angulate. The peristome is simple, broad in lateral view. The margins of the peristome are not sinuous. Peristomal rim situated distant from the peristome, reinforced by a strong and broad labial callus. The parietal margin of the aperture attached to the ultimate whorl. The peristome forms a narrow polished callus which is parietally discontinued. There are two strong acute and high parietalis. There is one ┐-like palatalis situated over the columellar side of the aperture. There is One large columellar denticle directed downwards. The columella is broad and smooth, strongly twisted, forming a broad and umbrella-like oblique columellaris in its basal third. The columellaris increases in width toward the shell interior; a part of it is visible in the aperture above the columellar denticle. Operculum is unknown.
Differential diagnosis: This is one of the smallest among Papuan *Moussonia*. This species is peculiar among all congeners due to the structure of






the internal lamellae (see above), extremely delicate axial striation, presence of a broad labial callus on the peristomal rim and in the angulate aperture (see above).

Ecology: Specimens were sampled at altitudes 426-565 m in primary lowland rainforests along streams and river.

Distribution: Northern New Guinea: Torricelli Mountains.

Conservation status: Data Deficient, DD. The current EOO is about 20 km^2, but the maximum EOO is definitely much larger. The current AOO is 12 km^2, the maximum AOO is likely higher. The population size and trend are unknown, but *Moussonia torricelli* sp. nov. seems not an abundant species. The main threat for this species cannot be identified. Since this species is known from low altitudes at the foot of the Torricelli ridge it is potentially endangered by deforestation and expansion of gardens. Further research is required in order to clarify species distribution, population size, trends and highlight threats.

Palaina s. l. **O. Semper, 1865**

Type species: *Diplommatina macgillivrayi* L.G.K. Pfeiffer, 1854 (subsequent designation by Iredale 1944: 303)

= *Anostomella* Martens, 1867 **syn. nov.**

Type species: *Pupa ascendens* Martens, 1864b (original designation)

New synonymy: There are no sufficient conchological characters to distinguish *Anostomella* from *Palaina*. Phylogenetic assessment made in 2016 (see Phylogeny chapter below) supports this decision since there is no significant distance between *Palaina angulata* and *Anostomella ascendens* (both species from Lease Islands).

Diagnosis: Shell is cylindrical or oval, dextral or sinistral, the constriction without teeth. The columellaris is present but not visible in the aperture. The operculum in many species with concentric periostracal ridges (lamellae) or spiral lines, as well as median appendages (e.g. tuba-like) on the outer surface. According to Kobelt (1902) the "tuba" (the area beyond the constriction) of *Palaina* is about ¾ ultimate whorl and of *Arinia* - about ½ a whorl, but this character is variable. In many Papuan *Palaina* making it an unreliable character in determining species relationships.

Remark: This genus is polymorphic and aberrant in conchological characters. As a result, there have been numerous attempts made to split *Palaina* into multiple subgenera (Table 10). The set of conchological characters used for defining these genera are polyphyletic and certain species have traits of the different groups. On the basis of my preliminary DNA-based phylogenetic studies I confirm Papuan *Palaina* s. l. as a monophyletic group (see also results by Webster et al. 2012). Further DNA studies are required to elucidate species relationships within each genera.

Distribution: Far East of Russia (Primorsky Krai), Japan, Korean Peninsula, Sundaland, the Philippines, Papuan Region, Vanuatu, eastern Australia, New Caledonia, Fiji and western Oceania. The range of this genus in the west is not clearly ascertained because generic limits between *Palaina* and *Arinia* are not clear.

Diversity in the study area: Seventy seven species hitherto confirmed (Table 11; next page).

Table 10. Satellite taxa of *Palaina* O. Semper, 1865 (according to Egorov 2013).

Taxon, author	**Distribution**
Cylindropalaina von Möllendorff, 1897	Far East of Russia, Japan, Korean Peninsula, Sundaland, the Philippines, Papuan Region, Vanuatu, Palau Islands, New Caledonia
Fermepalaina Iredale, 1945	Norfolk Island
Macropalaina von Möllendorff, 1897	Caroline Islands, Fiji, New Caledonia
Palmatina Iredale, 1944	Norfolk Island
Velepalaina Iredale, 1937	East Australia



Table 11. Characters matrix 5. Genus *Palaina* O. Semper.

Legends: + present; – absent; +/- or 1/2 – character indistinct; ? – unknown; b = shell with a strong bulb beyond the constriction; r = axial ribs on the penultimate whorl straight (1), sinuous (2) or specifically shaped (3); rp = axial ribs absent on two last whorls (0), ribbing pattern widely-spaced throughout the teleoconch (1), dense (2) or ribbing pattern changes abruptly (3); ss = spiral striae present on the penultimate and ultimate whorls at 80x magnification (+) or absent (-); l = axial ribs developed in a form of high lamellae (+) or not (-); u = umbilicus open (+) or closed (-); ap = position of the aperture central (c), shifted left (l) or right (r); p = peristome is simple (1), double (2) or triple (3); ck = columella simple or with flat callus (-) or provided with knob (+); o = operculum is primitive (-) or derivative (+); d = dextral or s = sinistral.

Taxon \ Character	b	r	rp	ss	l	u	ap	p	ck	o	d / s
Palaina adelpha	-	1	2	+	-	-	l	2	?	+	s
Palaina aerari (= *megamorpha* syn. nov.)	-	1	1	-	-	-	c	2	?	?	s
Palaina albrechti	-	1/2	2	+	-	-	c	3	-	-	s
Palaina angulata	-	1/2	1/2	+	-	-	c	2	-	+	d / s
Palaina ascendens	-	2	2	-	-	-	r	1/2	+	_	d
Palaina attenboroughi	-	2	1	+	+	-	c	2	-	+	s
Palaina beilanensis	-	1/2	2	+	-	-	c	3	?	?	s
Palaina bicornis	-	1/2	2	+	-	-	c	2	-	-	s
Palaina biroi	-	2	2	+	-	-	c	2/3	-	+	s
Palaina bougainvillei	-	1	2	-	-	-	c	2	-	+	s
Palaina brazieri	-	2	1	-	-	-	c	2	?	?	d
Palaina bundiana	-	2	2	-	-	-	c	2	?	-	s
Palaina carbavica	-	1	2	+	-	-	c	2	+	+	d
Palaina chrysostoma	+	2	3	-	-	-	c	2	-	+	d
Palaina citrinella	-	2	2	+	-	-	c	2	-	-	s
Palaina clappi	-	2	2	-	-	-	l	1	?	?	s
Palaina commixta (= *commixta jacquinoti* syn. nov.)	-	1/2	2	+	-	-	c	2	-	+	s
Palaina consobrina	-	2	2	+/-	-	-	c	2	?	?	s
Palaina cupulifera	-	3	1	+	-	-	l	2	?	?	s
Palaina dianctoides	+	1/2	2	+	-	-	r	2	?	+	d
Palaina diepenheimi	-	2	1	+	-	-	r	2	?	?	d
Palaina doberai	-	1	2	-	-	-	c	2	+	-	s
Palaina dohertyi	-	2	1	+	+	-	c	2	+	+	s
Palaina erythropeplos	-	1	2	+	-	+	c	2	?	?	s
Palaina extremita	-	1	1	+	-	-	c	2	+	-	s
Palaina flavocylindrica	-	1	2	-	-	-	c	2	-	+	s
Palaina floridensis	-	1	2	+	-	-	c	1	?	?	s
Palaina gardneri (= *delli* syn. nov.)	-	2	2	-	-	-	r	2	?	+	d
Palaina glabella	-	1	1	+	-	+/-	c	2	?	?	s
Palaina granulum	-	1	3	-	-	-	c	2	?	?	s
Palaina hartmanni	-	1/2	3	+	-	-	c	2	-	+	s
Palaina iha	-	1/2	1	+	-	-	c	2	-	-	s
Palaina imperfecta	-	1	1	-	-	-	c	3	-	?	s
Palaina inconspicua	-	1	2	-	-	-	c	2	?	?	s
Palaina insulana	-	1	1/2	-	-	-	c	3	?	?	s
Palaina laszloi	-	1	1	-	-	-	c	2	+	+	s
Palaina lengguru	-	2	3	+	-	-	c	2	-	+	s
Palaina leptotoreutos	-	1	2	+	-	-	c	2	?	?	s
Palaina liliputana	-	1	2	+	-	-	c	2	?	?	s
Palaina louisiade	-	1	2	-	-	-	l	2	-	+	s
Palaina mairasi	-	2	2	+	-	-	c	2	-	+	d
Palaina manggaraica	-	1	2	-	-	-	c	2	-	+	d
Palaina megalostoma	-	2	2	-	-	-	c	2	+	+	s
Palaina mengen	-	1/2	2	+	-	-	c	2	-	+	s
Palaina minuscularia	-	1/2	2	+	-	-	c	2	+	+	s
Palaina minutula	-	1	1	-	-	-	r	2	?	?	d
Palaina mirifica	-	1	3	-	-	-	c	2	-	+	s
Palaina misoolensis	-	1	2	+	-	-	c	2	+	+	s
Palaina mutis	-	2	2	-	-	+	l	2	-	+	s
Palaina novoguineensis	+	2	2	+	-	-	c	2	-	+	d
Palaina novopommerana (= *vexator* syn. nov.)	-	2	2	-	-	-	c	2	-	+	s
Palaina obiensis	-	1	3	-	+	-	c	2	+	+	s
Palaina onin	-	1/2	2	+	-	-	c	2	-	+	s
Palaina papuamontis	-	1	2	+	-	+	c	1	-	+	s
Palaina papuanorum	-	1/2	3	+	-	-	l	2	?	?	s






Table 11 (continued).

Palaina paradisaea	-	1	3	+	-	-	c	2	+	+	s
Palaina perspectiva	-	2	3	+	+	+	l	2	-	?	s
Palaina polystoma	+	1/2	2	-	-	-	c	2	-	+	d
Palaina ponsonbyi	-	2	2	-	+/-	-	c	2	?	?	s
Palaina propinqua	-	2	2	-	-	-	c	2	?	?	s
Palaina psittricha	-	1/2	3	+	-	-	l	2	-	+	s
Palaina quadricornis	-	1	2	+	-	-	c	2	-	?	s
Palaina repandostoma	-	1	2	-	-	-	l	1/2	?	?	s
Palaina scaevola	-	2	1	+	-	-	c	2	?	?	s
Palaina schneideri	-	1/2	3	-	-	-	c	1/2	?	?	s
Palaina silvicultrix	-	1	1	-	-	-	c	2	-	?	s
Palaina slapcinskyi	-	1	3	+	-	+	c	2	-	+	s
Palaina solomonensis	-	1/2	1	+	-	-	c	2	?	?	d
Palaina sparselamellata	-	1/2	2	-	+	-	c	2	-	+	s
Palaina tanimbarensis	-	3	3	+	+	-	c	2	-	?	s
Palaina telnovi	+	1/2	3	-	-	-	c	2	+	+	d
Palaina thomasrinteleni	-	3	2	-	+	-	c	2	-	?	d
Palaina vermeuleni	+	1	3	-	-	-	c	1	-	?	d
Palaina waigeo	-	1/2	3	+/-	-	-	c	2	-	-	s
Palaina wawiyai	+/-	1	1	-	-	-	c	2	-	?	s
Palaina wisemani	-	1/2	1	-	-	-	c	1	?	?	s
Palaina yamdena	-	1	2	+	-	-	c	2	-	?	s

Palaina (s. l.) ***adelpha* Soós, 1911** (Plate 31 figs 1-6, map 26)

Material 3 adults UWCP: Palaina adelpha Soós, 1911 Det.A.Wiktor 1996 [printed] / Museum of Nat.Hist. Wroclaw Papua-New Guinea, prov. Madang N of Nuru river ca 40 km SW of Madang in primeval rain forest, ca 100 m a.s.l. Leg. A.Wiktor 18.10.1990 No.2551 [printed].

Note: Soós' type collection was lost in the fire at the Hungarian Natural History Museum. Redescription is based on specimens collected from the type locality by Wiktor (1998).

References: Soós (1911: 348); Leschke (1912a: 143); Leschke (1912b: 73); van Benthem Jutting (1963: 702); Wiktor (1998: 16).

Measurements: Specimens from Madang env. H = 2 mm, D = 1 mm, HW = 1 mm, PD = 0.75 mm; H = 1.9 mm, D = 0.9 mm, HW = 0.9 mm, PD = 0.75 mm; H = 1.9 mm, D = 1 mm, HW = 1 mm, PD = 0.7 mm.

Description: Shell is very small, whitish, yellowish or pale rose, sinistral, cylindrical, with broadly conical apex. Shell with 6¼ convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is rather deeply impressed, especially for the ultimate whorl. The ultimate whorl is as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is not delimited on shell wall. The teleoconch is sculptured with very coarse, dense, straight ribs. The ribs becoming denser and more delicate in apertural view of the ultimate whorl. On the last half whorl the ribs becoming very coarse (thick) and 2x more widely-spaced. These changes in the ribbing pattern are not abrupt. The ribs are not synchronized with those of the previous whorls and are slightly oblique to the coiling axis. There are 10-12 ribs per 1 mm. Spiral striae are very inconspicuous. The aperture is not tilted to the coiling axis and is circular. The apertural rim is entire. The aperture is slightly shifted left against the coiling axis in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is double, Peristomal margins are not sinuous. The inner peristome forms a narrow continuous polished callus. No specimens were available to study the internal lamellae. The operculum is derivative - circular, rather thick in lateral view, consists of several layers of concentric ridges and with medial impression on the inner surface.

Ecology: This species is known from primary lowland to mid montane rainforests and occurs in wet leaf litter on both limestone and granite soils. Reported from 100-2300 m altitude.

Distribution: Eastern New Guinea: Madang Province. Lake Sentani (northern New Guinea) record by van Benthem Jutting (1963) is likely based on misidentified specimen of *Palaina* sp. (this specimen was not available for my study).

Conservation status: Least Concern, LC. The current EOO is about 940 km^2 (Wiktor 1998 and earlier authors), but the maximum EOO is likely higher. The current AOO is 28 km^2, but the maximum AOO is definitively much higher. The population size and trend are unknown for *P. adelpha*, but this species is not uncommon. The population is not severely fragmented. This species is currently known from several localities and inhabits lowlands up to mid montane rainforests. Loss of the habitat considered the main threat. Between 2001 and 2014 about 78000 ha of the rainforest were lost in Madang Province (calculated for canopy






density over 25% according to the Global Forest Watch (2016)). Main reasons of deforestation are commercial logging (for international trade), forest conversion to oil palm plantations, expansion of gardens, as well as mining. Human population growth is not rampant but continuous slash and burn agriculture has negative impact on the AOO. Continuing decline in extent and quality of habitat for this species is estimated. But *P. adelpha* is under-researched and is not uncommon. There are at least three locations. Further research is required in order to clarify species distribution, population size, trend and better understand threats.

Palaina (s. l.) ***aerari* (Dell, 1955) comb. nov.** (Plates 31 figs 13-15 & 40 figs 14-16, maps 11 & 19)
= *Palaina megamorpha* Solem, 1960 **syn. nov.** (Plate 40 figs 14-16)

Holotype *P. aerari* MONZ: M.202514, SOLI4403, Gardner, Norman 1944, Solomon Islands Treasury Islands Mono Island, ridge above Seveke River Leaf mould.

Holotype *P. megamorpha* UMMZ: FLW18 [printed] 200493 Palaina megamorpha Solem [handwritten] ½ Mi. from sea, behind Halavo, Florida Id., [printed] HOLOTYPE [handwritten] Solomons. Kuntz. 1944 MUSEUM OF ZOOLOGY UNIV. OF MICHIGAN [printed] / 200493 Holotype Diplommatinidae Palaina megamorpha Solem, 1960 Solomon Islands; Central; Florida Islands: Halavo Kuntz, R. E.; 1944: Dry; 1 University of Michigan Museum of Zoology Mollusk Division [printed, red border].

New combination: New combination is based on the conchological characters. There is a little denticle on the columellar side of the aperture in this species. This character is not supplemented by palatalis and parietalis and therefore this species not qualify as *Diplommatina*.

References *P. aerari*: Dell (1955: 423, 424), as *Diplommatina aerari*; Solem (1960: 49), as *Diplommatina aerari*; Clench (1965: 6), as *Diplommatina aerari*.

References *P. megamorpha*: Solem (1960: 50, 52, plate 6 fig. 1).

Measurements: Holotype *P. aerari* H = 3.9 mm, D = 2.2 mm, HW = 2.2 mm, PD = 1.6 mm. Holotype *P. megamorpha* H = 4.1 mm, D = 2.3 mm, HW = 2.3 mm, PD = 1.7 mm. Shell height of 4.51 mm given by Solem (1960) for holotype *P. megamorpha* is erroneous.

Description: Shell mid-sized to large, pink, creamy-coloured to brown, sinistral, high conical with conical apex. Shell with 5½-6¼ strongly convex whorls, the 1¾-1½ embryonic whorl is pitted. The suture is deeply impressed. The penultimate whorl is slightly bulbous. The ultimate whorl slightly constricted, ascending, slightly narrower than or as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well delimited by a deep broad impression supplemented with a short zone of denser placed axial ribs. The suture is cavity-like impressed above the constriction. The constriction situated on same axis with the columellar side of the aperture. There is a very distinct bulb just beyond the constriction above the columellar side of the aperture. The teleoconch is sculptured with very coarse widely-spaced straight or almost straight ribs. The ribs becoming more widely-spaced on the last half whorl, but they are dense at the constriction. There are abrupt changes in the ribbing pattern - the axial ribs rapidly becoming widely-spaced on the early whorls than on the ultimate and the penultimate ones. The ribs are not synchronized with those of the previous whorls. The ribs are straight or slightly oblique to the coiling axis. There are about 12-15 ribs per 1 mm but 9-10 ribs per 1 mm on the last half whorl. Spiral striae are lacking in studied specimen. The aperture is not tilted against the coiling axis, is circular or oval. The apertural rim is entire. An angulation is developed on the palatal / parietal junction of the peristome in holotype *P. megamorpha*. The parietal margin of the aperture is nearly straight. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, narrow in lateral view. A very broad zone of numerous high axial sinuous lamellae prior to the peristome in lateral view. The parietal margin of the peristome is attached to the ultimate whorl. The columellar margin of the inner peristome is slightly sinuous. The inner peristome forms a continuous polished callus. The margins of the outer peristome are not or just slightly sinuous. A little columellar denticle is present, not directed downwards. No specimens were available to study the internal lamellae. Operculum is unknown.

Ecology: Specimens reported from leaf litter of lowland rainforest.

Distribution: Solomon Islands: Nggela (= Florida), Guadalcanal, Mono islands.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. The maximum EOO estimated over 3000 km^2. The maximum AOO for this species is estimated between 500 and 2000 km^2. No information is available on the population size and trend. Threats are unknown for this species. Further basic research is required in order to clarify species status in the wild, its distribution, measure the population size and highlight threats.






Palaina (s. l.) ***albrechti* sp. nov.** (Figs 39, 102, 107 & 137, plate 31 figs 7-12, map 27)

http://zoobank.org/520A9B72-7454-4464-84C2-9BA4326455BF

Holotype UF (No 508078): UF 380599 Mollusca, Diplommatinidae 17 specimen(s) *Palaina* [printed] sp. 6 [handwritten] Papua New Guinea, Sandaun Province Maibu, base of S slope of Mount Sapau, 4 km NW of Parkop Village, mature hill forest along river 550 meters -3.3945° 142.528° Slapcinsky, J. 23 May 2005 JS-0799 dry FLORIDA MUSEUM OF NATURAL HISTORY [printed] / Palaina (micro!) JS-799 [handwritten].
Paratypes 8 adults, 2 subadults, 4 juv. UF & 1 adult KGC: same labels as holotype [one shell is broken].

Derivatio nominis: Patronymic. This species is devoted to my good friend, Dr. Christian Albrecht (Justus Liebig University, Giessen, Germany), an authority in phylogeny of freshwater gastropods.
Measurements: Holotype H = 1.3 mm, D = 0.75 mm, HW = 0.7 mm, PD = 0.6 mm. Selected paratypic specimens: H = 1.25 mm, D = 0.7 mm, HW = 0.7 mm, PD = 0.55 mm; H = 1.2 mm, D = 0.75 mm, HW = 0.7 mm, PD = 0.6 mm; H = 1.1 mm, D = 0.7 mm, HW = 0.6 mm, PD = 0.5 mm.
Description: Shell very small, white to yellowish, sinistral, cylindrical with broadly conical apex. Shell with 5¼ convex whorls, the 1½ embryonic whorl is microscopically pitted. The protoconch is placed oblique on the rest of the shell. The suture is moderately deeply impressed. The ultimate whorl is as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by a short shallow impression and a zone of slightly stronger sinuous axial ribs. The constriction is more or less centered in apertural view. The teleoconch is sculptured with delicate dense straight to hardly sinuous axial ribs. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of previous whorls and are slightly oblique to the coiling axis. There are 17-19 ribs per 0.5 mm. Spiral striae are delicate and dense, good visible on almost all teleoconch whorls (there are 9 rows of spiral striae per 30 µm measured above the aperture). The aperture is not tilted from the coiling axis, is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is triple, the palatal margin on the inner peristome is slightly sinuous. The inner peristome forms a continuous polished callus. The columella is smooth and shiny, broad internally and narrow medially, with an inconspicuous median angulation. The operculum is primitive - circular, transparent, with slightly elevated concentric lines.
Differential diagnosis: This species is similar to several minute Papuan *Palaina* species. It is primarily distinct due to very dense and rather delicate axial ribs supplemented with distinct and rather widely-spaced spiral striae. Specific characters are discussed in table 12.
Ecology: This species inhabits leaf litter of primary lowland rainforests and was collected at an altitude of 550 m.
Distribution: Northern New Guinea: Torricelli Mountains.

Table 12. Papuan species of *Palaina* s. l. similar to *P. albrechti* sp. nov. and their distinctive characters.

Species	**Character**	**Character in *P. albrechti* sp. nov.**
Palaina beilanensis	shell 2x higher than broad, H about 1.8-2 mm	shell less than 2x higher than broad, H about 1.1-1.3 mm
P. insulana sp. nov.	shell H about 1.8-1.95 mm, peristome rather broad in lateral view, triple and consists of several dense lamellae	shell H about 1.1-1.3 mm, peristome thin in lateral view and consists of a few lamellae
P. biroi	operculum with low concentric ridges and shallow median impression on the outer surface, 5 rows of spiral striae per 30 µm (measured above the aperture)	operculum without concentric ridges and without median impression, 9 rows of spiral striae per 30 µm (measured above the aperture),
P. iha sp. nov.	a short zone free of axial ribs at the constriction, shell H about 1.35-1.4 mm	no interruption in ribbing pattern at the constriction, shell H about 1.1-1.3 mm
P. lengguru sp. nov.	abrupt changes of the axial ribbing pattern - starting from the constriction ribs getting coarser, twice more distantly spaced	axial ribbing pattern changes evenly starting from the constriction
P. waigeo sp. nov.	abrupt changes of the axial ribbing pattern - starting from the constriction ribs becoming coarser, twice more distantly spaced	axial ribbing pattern changes evenly starting from the constriction






Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO since this species is known from single locality. The maximum EOO likely includes large area in Torricelli Mountains. The current AOO is 4 km^2, maximum AOO is likely higher. Population size and trend are unknown, but *Palaina albrechti* sp. nov. seems not abundant. The main threat for this species cannot be identified. Further research is required on distribution, population size, trend and threats for this species.

Palaina (s. l.) ***angulata* O. Boettger, 1891** (Figs 40-42, 99a-b, 114, plate 32 figs 1-13, map 8)

Lectotype SMF: Palaina angulata Bttgr. Batu merah, Leitimor, S. Amboina. [x] Ad. Strubell 90. [handwritten] / Senckenberg.Mus. [printed] 105070/01 [handwritten] Frankfurt-M. [printed] Palaina angulata O.Boettger Lectotypus! 1891 T.4 F.4 Molukken: Batu merah, Leitimor (S.Amboina) A.Strubell 1890 [handwritten] Sammlung O.Boettger [printed].

Paralectotype 1 adult SMF: Palaina angulata Bttg. Kusu-Kusu (Sereh) auf Leitimor, N. Amboina. x A.Strubell 91. [handwritten] / Senckenbg.Mus. [printed] 105071/1 [handwritten] Frankfurt-M. [printed] Palaina angulata O. Boettger Paratypus Molukken: Kusu-Kusu (Sereh),Leitimor (N-Amboina) A. Strubell 1891 [handwritten] Sammlung O.Boettger [printed].

Additional material: 5 adults NME & 5 adults KGC: INDONESIA E, Prov. Maluku tengah, Lease Islands, Saparua, kota Saparua ~1,5 km NE, 03°33'31"S, 128°39'50"E, 11.IV.2009, secondary lowland forest & shrubs, leg. D.Telnov; 3 adults & 2 juv. KGC: INDONESIA E, Central Moluccas, Lease Islands, southern arm of Ambon Is., Ambon (kota) 5 km E, Soya vill. ~1 km E, 03°42'36"S, 128°13'16"E, 17.VIII.2016, secondary lowland rainforest, leaf litter, leg. L.Wagner; 1 adult KGC: INDONESIA E, Central Moluccas, Lease Islands, northern arm of Ambon Is., Waai 4 km NW, 03°32'56"S, 128°17'17"E, 300 m, 19.VIII.2016, secondary lowland rainforest, leaf litter, leg. L.Wagner.

References: Boettger O. (1891: 286, pl. 4 fig. 4); Kobelt & von Möllendorff (1898: 152), checklist, as *Palaina* Subgen. *Palaina* s. str. *angulata*; Kobelt (1902: 394); Boettger C.R. (1908: 184), as *Palaina (Eupalaina) angulata*; van Benthem Jutting (1953: 287); Zilch (1953: 9, pl. 5 fig. 60), as *Palaina (Palaina) angulata*; Monk et al. (1997: 395).

Measurements: Paralectotype H = 2.5 mm, D = 1.55 mm, HW = 1.3 mm, PD = 1.1 mm. Selected specimens from Soya vill. env., Ambon Is.: H = 2.8 mm, D = 1.6 mm, HW = 1.5 mm, PD = 1.3 mm; H = 2.7 mm, D = 1.75 mm, HW = 1.45 mm, PD = 1.3 mm. Selected specimens from Saparua Is.: H = 2.4 mm, D = 1.3 mm, PD = 1 mm; H = 2.3 mm, D = 1.4 mm, PD = 1 mm.

Description: Shell is small, whitish to yellowish, prevalently dextral but also sinistral specimens are known (from Saparua Island), cylindrical with conical apex. Shell with 6¼–6½ convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is slightly constricted, almost as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is delimited by a flat impression, and the suture is deeper impressed above the constriction. Additionally, a short zone of denser placed axial ribs (in certain specimens, see below) is present at the constriction. The constriction situated on same axis with the columellar side of the aperture. The teleoconch is sculptured with rather coarse, dense or widely-spaced, straight or slightly sinuous axial ribs. There are no abrupt changes in the ribbing pattern in specimens from Ambon Island. In specimens from Saparua Island the axial ribs becoming much denser at the constriction. The ribs are partially synchronized with those of the previous whorls and are oblique to the coiling axis. There are 4-6 ribs per 0.5 mm. The ribs are widely-spaced on the last half whorl. Spiral striae are distinct and dense. There are 2-3 (in specimens from Ambon) to 4-5 (in specimens from Saparua) rows of spiral striae per 30 µm (measured above the aperture). The aperture is not tilted to the coiling axis and is circular or oval and has entire apertural rim. The position of the aperture is more or less central below the coiling axis or the aperture is slightly shifted to the right in apertural view. The peristome is double. The parietal margin of the peristome is attached to the ultimate whorl. The margins of the inner peristome are not sinuous. The palatal margin of the outer peristome is slightly sinuous. The basal margin of the outer peristome is somewhat reflexed. The columellar margin of the outer peristome is sinuous, widening into an obtuse angular protruding (which is less conspicuous in certain Saparua specimens). The columella is shiny and broad with glass-like semitransparent inner edge. The operculum is derivative - circular, with concentric ridges on the outer surface.

Phylogeny: According to results of Ambon specimens' COI analysis this species represents a separate clade of *Palaina* species from the Lesser Sunda Islands (*P. manggaraica* (B. Rensch, 1931) and Lease Islands (*P. ascendens* (Martens, 1864) (see section "Phylogeny").

Ecology: *P. angulata* inhabits both primary and secondary lowland rainforests on limestone soils, as well as closed canopy gadens. This species is






recorded from up to 1000 m altitude. Specimens occur in wet leaf litter on the undersides of fallen leaves and under pieces of decaying wood.
Distribution: Lease Islands (Central Moluccas): Ambon Island, Haruku Island, Saparua Island.
Conservation status: Endangered, EN B1aB2a-b(ii,iii). The current EOO is about 220 km^2, but the maximum EOO is estimated 1700 km^2 taking into account the area of Ambon, Haruku and Saparua. The current AOO is about 28 km^2, but the maximum AOO estimated higher but probably not extends 500 km^2. The population size and trend are unknown however *P. angulata* is not uncommon. The population is not severely fragmented. This species is currently known from several localities and inhabits its lowland rainforests with preference to those on limestone soils. Habitat loss considered the main threat. Deforestation drivers are forest conversion to gardens, timber use for building construction and collecting of firewood. Human population growth is rampant on Lease Islands and the population density is high. Continuing decline in extent and quality of habitat is documented and projected for *P. angulata*. Decline in AOO is documented for Ambon. *P. angulata* is also found in disturbed forests with partially closed canopy, and this species survived in gardens on Saparua Island. There are at least 4 locations. There are no nature conservation areas on Lease Islands and *P. angulata* population is not protected. Further research is required on distribution of this species and on the population size. Establishing nature conservation area to protect remaining old-growth forests on Haruku and Ambon is highly recommended.

Palaina (s. l.) ***ascendens* (Martens, 1864)** (Fig. 43, plate 31 figs 16-20, map 9)

Lectotype MHUB [herewith designated]: Amboine [handwritten] / Diplomatina [sic!] 6270. Pupa * ascendens Martens Amboina vMartens [handwritten] / Anostomella [handwritten] / Zoolog. Museum Berlin [printed] Anostomella ~~Pupa~~ [original correction] ascendens (Marts.)* Amboina 6270 Martens [handwritten].
Paralectotype 1 adult MHUB [herewith designated]: same labels as lectotype [shell is broken].
Additional material 19 adults 1 juv KGC, 1 adult NME & 1 adult SNSD: INDONESIA E, Prov. Maluku tengah, Lease Islands, Saparua, kota Saparua ~1,5 km NE, 03°33'31"S, 128°39'50"E, 11.IV.2009, secondary lowland forest & shrubs, leg. D.Telnov; 1 juv. KGC: INDONESIA E, Central Moluccas, Lease Islands, southern arm of Ambon Is., Ambon (kota) 5 km E, Soya vill ~1 km E, 03°42'36"S, 128°13'16"E, 17.VIII.2016, secondary lowland rainforest, leaf litter, leg. L.Wagner; 1 adult, 1 subadult & 3 juv. KGC: INDONESIA E, Central Moluccas, Lease Islands, Haruku Is., Pelauw vill. 3.3 km S, 03°32'30"S, 128°27'15"E, 150-170 m, 18.VIII.2016, secondary lowland rainforest, leaf litter, leg. L.Wagner.

Note: Consider synonymy of *Anostomella* with *Palaina* above.
References: Martens (1864b: 528), as *Pupa ascendens*; Martens (1867: 386, pl. 22 fig 23); Ancey (1887: 279), as *Diancta (Anostomella) ascendens*; Tenison-Woods (1888: 1054), as *Pupa ascendens*; Kobelt & von Möllendorff (1898: 135), checklist; Boettger O. (1891: 287); Kobelt (1902: 422); Thiele (1929: 110); Wenz (1938: 483); van Benthem Jutting (1953: 287, 312-313); Monk et al. (1997: 395); Egorov (2013: 22).
Measurements: Lectotype H = 3.9 mm, D = 3.1 mm, HW = 1.9 mm, PD = 1.7 mm. Selected specimens from Saparua Island: H = 3.8 mm, D = 2.8 mm, HW = 1.95 mm, PD = 1.55 mm; H = 3.5 mm, D = 2.8 mm, HW = 1.9 mm, PD = 1.6 mm; H = 3.65 mm, D = 2.8 mm, HW = 1.95 mm, PD = 1.6 mm.
Description: Shell is large, whitish to pale orange or pale brown, dextral, very obese and broadly oval with a shortly conical apex. Shell with 6¼ slightly convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is rather deeply impressed. The ultimate whorl is constricted and ascending, by apertural view, narrower than the penultimate whorl. The umbilicus is closed in adults by the ascending tuba. The constriction is well delimited by the suture cavity-like strongly impressed above the constriction and by the ribs abruptly becoming dense and delicate. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse, dense, and inconspicuously sinuous ribs. The ribs are partly synchronized with those of the previous whorls. The ribs are oblique to the coiling axis and there are 8-9 ribs per 1 mm. The ribs becoming dense in front of the ultimate whorl prior to the constriction and become more widely-spaced beyond the constriction. Spiral striae are lacking. The aperture ascends as the ultimate whorl is. The aperture is slightly oval, its maximum diameter is when measured from parietal to basal side and has entire apertural rim. The aperture is shifted right against the coiling axis in apertural view. The peristome is indistinctly double. The palatal and columellar margins of both the inner and outer peristomes are somewhat sinuous. The inner peristome forms a continuous polished callus. The parietal margin of the peristome is attached to the ultimate whorl. The columella is very broad and smooth with a large triangular median knob which is directed backwards. The columella is visible in the aperture in a form of a flat broad cal-






lus. The operculum is primitive - circular and concave on the outer surface.

Phylogeny: According to results of Ambon and Haruku specimens' COI analysis this species represents a separate clade of *Palaina* from the Lesser Sunda (*P. manggaraica* (B. Rensch, 1931) and Lease Islands (*P. angulata* O. Boettger, 1891) (see chapter "Phylogeny").

Ecology: This species known from primary and secondary lowland rainforests on limestone soil as well as from closed-canopy gardens. Specimens found under leaf litter.

Distribution: Lease Islands (Central Moluccas): Ambon, Haruku, Saparua.

Conservation status: Endangered, EN B2ab(ii,iii). *Palaina ascendens* is endemic to Central Moluccas and hitherto known from three of four main Lease Islands. Its presence on Seram Island is projected on areas with limestone soils. The current EOO is about 600 km^2, but maximum EOO estimated up to 200000 km^2. The current AOO is 28 km^2, but maximum AOO estimated much higher, but certainly less than 500 km^2. *P. ascendens* inhabits lowland rainforests, as well as wet closed canopy gardens. Population size and trends are unknown, but at least on Saparua this species is not uncommon in suitable habitat. Habitat loss is the main threat for *P. ascendens*. The area of occupancy is under constant pressure due to growing human population, expansion of human settlements and factories, wood consumption for various purposes and conversion of rainforest into gardens and plantations. Population is threatened by limestone mining for road and building construction. These threats are likely to continue on a larger scale as a result of population growth. Further decline in potential AOO is projected. Rainforests only remain in difficult to access mountains in this region, *P. ascendens* survive on Lease Islands in forest remnants and gardens. Further research is needed to clarify population size and trend for this species. Establishing nature conservation areas to protect remaining old-growth forests on Haruku and Ambon is highly recommended.

Palaina (s. l.) ***attenboroughi*** **sp. nov.** (Figs 44-45, 117, plate 32 figs 14-23, map 18)

http://zoobank.org/A9E64F72-C826-4226-8E64-8BE0D34B43DD

Holotype NME: INDONESIA E, Raja Ampat, Misool Island (central), River Gam upstream, Gamta vill. 12-14 km NW, 01°57'50"S, 130°11'09"E, 100-350 m, 06.II.2012, primary lowland rainforest, limestone rocks, leg. D.Telnov.

Paratypes 74 specimens: 23 adults & 4 juv. KGC, 3 subadults & 3 juv. NME: same label as holotype; 10 adults KGC, 5 adults NME: INDONESIA E, Prov. Raja Ampat, distr. Misool Barat, Lilinta (Lelintah) vill. ~13,5 km NW, Gamta vill. ~11 km NWW, River Gam valley in the middle of course, 01°57'49"S, 130°11'10"E, 03.IV.2009, primary lowland rainforest, leg. K.Greķe; 12 adults KGC, 10 adults & 1 juv. NME, 2 LKCNHM & 1 SMF: INDONESIA E, Raja Ampat, Misool Island (central), River Gam upstream, Gamta vill. 12-14 km NW, 01°57'50"S, 130°11'09"E, 70-350 m, 04-06.II.2012, primary lowland rainforest on limestone, leg. D.Telnov.

Derivatio nominis: Patronymic. With pleasure I name this species in honour of Sir David Frederick Attenborough (London, United Kingdom), the famous British naturalist and broadcaster, who devoted most of his life nature conservation through education.

Measurements: Holotype: H = 3.3 mm, D = 1.9 mm, HW = 1.4 mm, PD = 1.4 mm. Selected paratypic specimens: H = 3.3 mm, D = 2 mm, HW = 1.4 mm, PD = 1.4 mm; H = 3.2 mm, D = 1.9 mm, HW = 1.3 mm, PD = 1.3 mm; H = 3.2 mm, D = 1.7 mm, HW = 1.2 mm, PD = 1.3 mm; H = 3.1 mm, D = 1.6 mm, HW = 1.3 mm, PD = 1.3 mm; H = 3.1 mm, D = 1.7 mm, HW = 1.3 mm, PD = 1.35 mm; H = 2.8 mm, D = 1.4 mm, HW = 1.1 mm, PD = 0.9 mm.

Description: Shell is small, white with yellow 2-4 first whorls, sinistral, narrow and high conical. Shell with 8 convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is strongly narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well defined by presence of a shallow broad impression and a short zone of somewhat sparser axial ribs. The constriction situated on same axis with the palatal side of the aperture or is centered (in apertural view). The teleoconch is sculptured with coarse widely-spaced strong and slightly sinuous axial lamellae-like ribs. The ribs are bending counter-clockwise near and in the suture. The ribs becoming very distant on the last half whorl. There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those of the previous whorls and are slightly oblique to the coiling axis. There are 4 ribs per 0.5 mm. Spiral striae very delicate and dense. The aperture is not tilted to the coiling axis and is circular or oval and has entire apertural rim. The aperture is more or less centered below the penultimate whorl or aperture is slightly shifted left in apertural view. The peristome is double, very broad and expanded (but can be not fully developed in certain adult specimens). The parietal






margin of the peristome is attached to the ultimate whorl. Laterally the peristome consists of numerous dense lamellae. The inner peristome forms a continuous polished callus. The palatal margins of both peristomes are slightly sinuous. The columella is broad and shiny, slightly twisted medially. The operculum is derivative - thick in lateral view, consists of several layers of concentric ridges and with a broad, spatula-like median "handler" on the inner surface.

Differential diagnosis: Most closely related with *Palaina dohertyi* E.A. Smith, 1897 (West New Guinea: Onin Peninsula) but differs from it in higher shell, less high and not humped axial ribs, the penultimate whorl being higher (less high in *P. dohertyi*) and the columella is lacking median knob (knob is present in *P. dohertyi*).

Phylogeny: According to results of COI analysis this species represents a separate clade most related with Misool species *P. bicornis* van Benthem Jutting, 1958 which again represents a different but related clade.

Ecology: Primary lowland rainforests on limestone soils. Specimens occur in leaf litter on the undersides of fallen leaves and under pieces of decaying wood. Specimens sampled at altitudes 70-350 m, found both at base of limestone rocks in very moist conditions and at the very top of limestone ridges where the substrate is dry because of good drainage.

Distribution: Raja Ampat Islands: Misool Island.

Conservation status: Least Concern, LC. Not enough data available to calculate the current EOO. The maximum EOO is estimated about 2000 km^2 taking into account the area of Misool Island and available habitat. The current AOO is 4 km^2. The maximum AOO is likely much higher. No information is available on the population size and trend, however *P. attenboroughi* sp. nov. is locally common in central Misool. This species is currently known from one locality and inhabits primary lowland rainforests on limestone soils. No threats to this species have been identified. Misool Island is still very pristine and covered by primary rainforests for over 75%. However, human population is growing and local development is ongoing, especially because of establishing new administrative divisions on this island (in order to raise extra funding). Hitherto no large scale deforestation recorded on Misool, but some areas (for example near Lilinta vill. in the SE) suffered from small-scale illegal logging over a decade ago. Significant decline in EOO, AOO or quality of habitat cannot be projected for this species within next 10 years. Further research is required on distribution and ecological preferences of this species.

Palaina (s. l.) ***beilanensis* Preston, 1913** (Plate 32 figs 24-27, map 6)

Syntypes: 1 adult BMNH: Palaina beilanensis Pre[ston] Beilan – Beilan Isl. Moluccas. 1914.1.7.461 [handwritten] / Type. [printed] / beilanensis Preston. Dutch. E. Indies. [handwritten] [shell is badly broken]; 2 adults FMNH: 72965 [printed] / 72965 FIELD MUSEUM OF NATURAL HISTORY MOLLUSCA: DIPLOMMATINIDAE 2 dry specs. Syntype(s): Palaina beilanensis Preston, 1913 Sta. FMNH72965, Indonesia, Moluccas, N of Obi, Beilan Beilan ex F.F. Laidlaw ex H.B. Preston (Acc.# 11666) [printed].

Additional material 1 adult MHUB: Zoolog. Museum Berlin. [printed] Palaina beilanensis Prest. Ind. of Beilan-Beilan Moluccen [sic!] 63785 Preston [handwritten] / 63785 [handwritten].

References: Preston (1913: 438).

Measurements: Specimen from MHUB H = 1.8 mm, D = 0.85 mm, HW = 1.1 mm, PD = 0.7 mm. Selected syntype from FMNH: H = 1.9 mm, D = 0.85 mm, HW = 0.9 mm, PD = 0.65 mm.

Description: Shell is very small, whitish, sinistral, narrow cylindrical with flattened apex. Shell with 5½ rather flat whorls, the $1^1/_3$ embryonic whorl is microgranulate. The suture is moderately deeply impressed. The ultimate whorl is slightly narrower than or as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by a very shallow impression and a short zone of stronger sinuous axial ribs. The constriction situated on same axis with the columellar side of the aperture. The teleoconch is sculptured with fine, dense, straight to slightly sinuous ribs. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are slightly oblique to the coiling axis. There are about 15 ribs per 0.5 mm. The ribs becoming somewhat coarser and more widely-spaced on the ultimate whorl. Spiral striae are very delicate and dense. The aperture is tilted about 10° to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is triple, Peristomal margins are not sinuous. The inner peristome forms a continuous polished callus. No specimens were available to study the internal lamellae. The operculum is primitive - circular, without concentric ridges.

Ecology: Unknown. Belangbelang Island is cov-





ered by primary lowland rainforest on limestone soils.

Distribution: Southernmost North Moluccas: Belangbelang Island of Obi Islands group. Almost certainly should be found on other islands of Obi group, particularly on limestone Obilatu Island.

Conservation status: Data Deficient, DD. *Palaina beilanensis* is known by series of specimens collected over 100 years ago from single locality. Not enough data available to calculate current EOO and AOO. The area of Belangbelang Island is 7 km^2. The total area of all Obi Islands is about 5100 km^2. It is very unlikely *P. beilanensis* occurs all over Obi Islands (especially not on distant Gomumu and Tobalai) and only small fractions of Obi rainforests known to be located on limestone soil. The current EOO is unknown. Consequently, the maximum EOO for this species is certainly below 5000 km^2. Habitat loss considered the main threat. Belangbelang Island is uninhabited, but all neighbouring islands (small Bisa, Obilatu, Tapat and large Obira) are inhabited. The area of Obi Islands covered by rainforest is decreasing consequently; between 2001 and 2014 about 11000 ha of the rainforest were lost (calculated for canopy density over 25% according to the Global Forest Watch (2016)). Considering human population growth on Obi Islands and presence of large nickel mine in the W of Obira Island (which attract workers from other regions of Indonesia), this trend is likely to continue. Malacological research on Obira Island carried out by the University of Florida (2008), as well as on Bisa and Obira islands by the Entomological Society of Latvia (2011, 2013) gave no result for this species. The population of *P. beilanensis* is likely small or restricted to Belangbelang and, possibly, Obilatu and Tapat islands. Additional research is required on Belangbelang to clarify status of this species in the wild and estimate size and trend of the population. Further search for *P. beilanensis* distribution to be performed on Obilatu and Tapat islands.

Palaina (s. l.) ***bicornis* van Benthem Jutting, 1958**

(Figs 46-47, plate 33 figs 1-12, map 18)

Holotype NMNL: Indonesia, Papua, Misoöl, Waima, 0-75 m, Lieftinck, M.A. 1948.09.13 [printed].

Additional material: 10 adults & 6 juv. NME, 10 adults, 3 subadults & 10 juv. KGC: INDONESIA E, Prov. Raja Ampat, distr. Misool Barat, Lilinta (Lelintah) vill. ~13,5 km NW, Gamta vill. ~11 km NWW, River Gam valley in the middle of course, 01°57'49"S, 130°11'10"E, 03.IV.2009, primary lowland rainforest, leaf litter, leg. K.Greķe; 3 adults & 2 subadults KGC, 1 adult, 2 subadults & 6 juv. NME: INDONESIA E, Raja Ampat, Misool Island S, Lilinta (Lelintah) vill. env., 02°02'57"S, 130°15'58"E, 6 m, 02-03.II.2012, primary lowland rainforest on limestone, leg. D.Telnov; 15 adults KGC, 7 adults, 4 subadults & 7 juv. NME: INDONESIA E, Raja Ampat, Misool Island (central), River Gam upstream, Gamta vill. 12-14 km NW, 01°57'50"S, 130°11'09"E, 70-350 m, 04-06.II.2012, primary lowland rainforest on limestone, leg. D.Telnov.

References: van Benthem Jutting (1958a: 295, 316); van Benthem Jutting (1963: 702).

Measurements: Paratype H = 2.4 mm, D = 1.8 mm, HW = 1.4 mm, PD = 1.1 mm. Selected specimens from River Gam valley, central Misool: H = 2.1 mm, D = 1.5 mm, HW = 1.2 mm, PD = 0.7 mm; H = 2.5 mm, D = 1.65 mm, HW = 1.3 mm, PD = 1.2 mm.

Description: Shell is small with very thick wall, whitish, yellowish or greenish, sinistral, broadly fusiform with conical apex. Shell with 6 strongly convex whorls, the 1½-2 embryonic whorls are microscopically pitted. The suture is deeply impressed. The penultimate whorl is slightly bulbous. The ultimate whorl is constricted, narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well defined by a short and shallow impression, a short zone of denser and stronger sinuous axial ribs and presence of a deep cavity-like impression on the suture above the constriction. The constriction is more or less centered in apertural view. The teleoconch is sculptured with very delicate, dense, straight to slightly sinuous ribs. There are no abrupt changes in the ribbing pattern. The ribs are synchronized with those of the previous whorls and are slightly oblique to the coiling axis. There are 6-8 ribs per 0.5 mm. The ribs becoming more widely-spaced and coarse on the last half whorl. Spiral striae are poorly indicated, very delicate and dense, only visible on the ultimate whorl. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a continuous polished callus. The margins of the inner peristome are not sinuous. The outer peristome is thick in lateral view, provided with an obtuse protrudings at the parietal / palatal and columellar / parietal junctions. The palatal margin of the outer peristome is sinuous. The columella is smooth and thin. The operculum is derivative - thin in lateral view, transparent, in a form of a flying disc with raised margin, large handle-like median protruding on the inner surface, without concentric









ridges or lines.
Phylogeny: According to results of COI analysis this species represents a separate clade most related with Misool species *P. attenboroughi* sp. nov. which represents a near-standing clade.
Ecology: This species is known from primary lowland rainforests on limestone soils and occurs in wet leaf litter, under decaying wood and in cavities on limestone rocks. Specimens aggregate in number on the underside of large fallen leaves and were not observed under small leaves. Reported from near sea level up to 450 m altitude.
Distribution: Raja Ampat Islands: Misool Island.
Conservation status: Least Concern, LC. The current EOO is about 160 km^2. The maximum EOO estimated more than 10000 km^2 taking into account the area of Misool Island and available habitat. The current AOO is 12 km^2. The maximum AOO is likely much higher. No information is available on the population size and trend, however *P. bicornis* is one of the most common Diplommatinidae species in central part of Misool. This species is currently known from several localities and inhabits old-growth lowland rainforests on limestone soils. The population is not severely fragmented. No major threat has been identified. Misool Island is still very pristine and covered by primary rainforests for over 75%. However, human population is growing and local development is ongoing especially because of establishing new administrative divisions on this island (in order to attract funding). Hitherto no large scale deforestation recorded on Misool, but some areas (for example near Lilinta vill. in the SE) suffered from illegal logging over a decade ago. Significant decline in EOO, AOO or quality of habitat cannot be projected for this species within next 10 years. Further research is required to highlight threats for *P. bicornis*.

Palaina (s. l.) ***biroi* Soós, 1911** (Figs 48 & 118, plate 33 figs 13-27, map 27)

Lectotype NMNL: Friedrich-Wilhelmshafen, Biró 1901.
Additional material: 42 adults & 3 juv. UWCP: Museum of Nat. Hist., Wroclaw Papua-New Guinea, Prov. Madang Balek ca 15 km SW of Madang by the road to Lae. In primeval rain forest on the cliff, limestone. ca. 100 m a.s.l. Leg. A.Wiktor 6.10.1990 No. 2531 [printed] / Palaina biroi Soós, 1911 Det.A.Wiktor 1996 [printed] / 2531 Balek 6 X [handwritten]; 3 adults: Museum of Nat. Hist., Wroclaw Papua-New Guinea, Prov. Madang Nabanab Mission ca 15 km NW of Madang, near village in destroyed forest ca 380 m a.s.l. Leg. A.Wiktor 10.10.1990 No. 2535 [printed] / Palaina biroi Soós, 1911 Det.A.Wiktor 1996 [printed]; 8 adults & 2 juv.: Museum of Nat. Hist., Wroclaw Papua-New Guinea, Prov. Madang in mangrove near Riwo vill. /N of Madang/. Leg. A.Wiktor 15.10.1990 No. 2546 [printed] / Palaina biroi Soós, 1911 Det.A.Wiktor 1996 [printed]; 18 adults & 1 juv.: Museum of Nat. Hist., Wroclaw Papua-New Guinea, Prov. Madang Balek ca 15 km SW of Madang by the road Madang-Lae in primeval rain forest, on the cliff and between the caves, limestone ca. 100 m a.s.l. Leg. A.Wiktor 12.11.1990 No. 2584 [printed] / Palaina biroi Soós, 1911 Det.A.Wiktor 1996 [printed] / 2584 [handwritten]; 2 adults: Museum of Nat. Hist., Wroclaw Papua-New Guinea, Prov. Madang near Korog vill.,ca 200 m a.s.l. Leg. A.Wiktor 26.11.1990 No. 2600 [printed] / Palaina biroi Soós, 1911 Det.A.Wiktor 1996 [printed] / 2600 26XI Korog [handwritten]; 46 adults & 4 juv. UF, 4 adults KGC: UF 476278 Mollusca, Diplommatinidae 1-spec. [sic! over 50 specimens available] *Palaina* Papua New Guinea, Madang Province, Rempi Mission, Sempi River 36 meters -5.0104° 145.7839° 9 Nov 2012, PNG12-0320, PM14 John Slapcinsky 75% ethanol 476278 DNA SUBSAMPLE ONLY FLORIDA MUSEUM OF NATURAL HISTORY / PNG12-0320; 15 adults & 2 juv. UF: UF 476300 Mollusca, Diplommatinidae 19-spec. [sic! only 17 specimens available] *Palaina* Papua New Guinea, Madang Province Mototua -5.0755° 145.7734° 15 Nov 2012, PNG12-0646, PM23 John Slapcinsky 75% ethanol FLORIDA MUSEUM OF NATURAL HISTORY / PNG12-0646; 1 adult UF: UF 475831 Mollusca, Diplommatinidae 1-spec. *Palaina* Papua New Guinea, Madang Province, Rempi Area, S Ululan -5.0093° 145.7708° 19 Nov 2012, PM31 John Slapcinsky dry FLORIDA MUSEUM OF NATURAL HISTORY.

Note: Soós' type collection was lost in the fire at the Hungarian Natural History Museum. Redescription is based on the lectotype from NMNL and on comparative specimens collected from the type locality by Wiktor (1998).
References: Soós (1911: 348); Leschke (1912a: 145); van Benthem Jutting (1963: 702); Wiktor (1998: 17).
Measurements: Selected specimens from Madang Province (UWCP): H = 1.6 mm, D = 0.85 mm, PD = 0.7 mm; H = 1.6 mm, D = 0.9 mm, PD = 0.6 mm; H = 1.6 mm, D = 0.9 mm, PD = 0.7 mm; H = 1.5 mm, D = 0.85 mm, PD = 0.6 mm; H = 1.5 mm, D = 0.8 mm, PD = 0.65 mm; H = 1.4 mm, D = 0.8 mm, PD = 0.6 mm; H = 1.4 mm, D = 0.8 mm, PD = 0.65 mm; H = 1.3 mm, D = 0.75 mm, PD = 0.5 mm. Selected specimen from Rempi Area (UF) H = 1.3 mm, D = 0.8 mm, HW = 0.75 mm, PD = 0.6 mm.
Description: Shell is very small, whitish, creamy, yellowish or strong yellow, sinistral, cylindrical with broadly conical apex. Shell with 5-5½ convex whorls, the 1½ embryonic whorl is microscopically pitted. Pits are arranged in axial rows. The protoconch is placed oblique on the rest of the shell. The suture






is moderately deeply impressed. The ultimate whorl as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by a shallow impression and (in certain specimens) much sparser axial ribs. The constriction is more or less centered in apertural view. The teleoconch is sculptured with relatively fine dense sinuous ribs. In certain specimens the ribs becoming very widely-spaced (up to 4x) above the aperture, which is not the case in the lectotype. There are abrupt changes in the ribbing pattern at the constriction area. The ribs are not synchronized with those of the previous whorls and are slightly oblique to the coiling axis. There are 12-16 ribs per 0.5 mm. Spiral striae are extremely delicate, partly not indicated but dense when indicated. At 300x magnification there are 5 rows of spiral striae per 30 µm measured above the aperture. The aperture is not or tilted about 10° to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is double or triple, all margins are not sinuous or all palatal margins are slightly sinuous. The inner peristome forms a continuous polished callus. The columella is smooth and shiny, broad in upper part and narrowed towards base, provided with an obtuse median angulation. The operculum is derivative - circular, transparent, with slightly elevated concentric lines and very shallowly medially impressed on the outer surface.

Ecology: This species inhabits primary and secondary lowland to upper montane rainforests and occurs in wet leaf litter on limestone and granite soil. Reported from altitudes 60-3300 m.

Distribution: Eastern New Guinea: provinces Chimbu and Madang. Record from Doberai Peninsula (near Manokwari) in western New Guinea by van Benthem Jutting (1963) is very dubious and is likely based on misidentified specimen (which was not available for my study).

Conservation status: Least Concern, LC. The current EOO is about 2700 km^2, but the maximum EOO estimated higher. The current AOO is 40 km^2, but the maximum AOO is likely much higher. No information is available on the population size and trend. However, *P. biroi* is rather common species widespread in Madang Province and adjacent part of Chimbu. This species is known from several localities and inhabits lowland and mid montane rainforests. The population is not severely fragmented. Habitat loss is the main threat. Between 2001 and 2014 about 78000 ha of the rainforest were lost in Madang Province (calculated for canopy density over 25% according to the Global Forest Watch (2016)). Deforestation reasons are commercial logging for international trade, expansion of oil palm plantations and gardens as well as mining. Human population growth is not rampant but continuous slash and burn agriculture has negative impact on the AOO. Continuing decline in extent and quality of habitat for this species is estimated. But since *P. biroi* is widespread, common from mangrove swamps to the mid montane rainforests, no continuous decline in EOO or AOO is projected. There are at least 4 locations. Further research is required on ecology of this species as well as on the population size and trend.

Palaina (s. l.) ***bougainvillei*** **sp. nov.** (Fig. 49, plate 34 figs 1-8, map 19)

http://zoobank.org/45C1B9AD-08E9-4767-B798-BA4EE4BA6862

Holotype UF (No 508077): UF 475819 Mollusca, Diplommatinidae 22-spec. *Palaina* Papua New Guinea, Bougainville Province Bougainville Island, Kokopo overgrown coconut plantation -5.4303° 154.6853° 5 Dec 2012, JDS-1287 John Slapcinsky, Cindy Bick dry FLORIDA MUSEUM OF NATURAL HISTOR [sic!] / Mollusca 475819.

Paratypes 101 specimens: 12 adults 1 subadult & 5 juv. UF, 3 adults KGC: same labels as holotype [1 adult shell is badly broken]; 50 adults & 12 juv. UF, 6 adults KGC: UF 475781 Mollusca, Diplommatinidae 50-spec. *Palaina* Papua New Guinea, Bougainville Province Bougainville Island, Kokopo overgrown coconut plantation -5.4303° 154.6853° 5 Dec 2012, JDS-1287 John Slapcinsky, Cindy Bick 75% ethanol FLORIDA MUSEUM OF NATURAL HISTORY [printed] / JDS 1287 [handwritten]; 9 adults & 1 juv. UF, 2 adults KGC: UF 476386 Mollusca, Diplommatinidae 10-spec. *Palaina* Papua New Guinea, Bougainville Province Buka Island, 5 km SW of Suhin Village -5.2265° 154.6781° 6 Dec 2012, PNG12-3249, JDS-1289 John Slapcinsky, Cindy Bick 75% ethanol 476386 DNA subsample FLORIDA MUSEUM OF NATURAL HISTORY [printed] / PNG12-3249 [printed] / 1289 [handwritten].

Derivatio nominis: Toponymic. This species is named after Bougainville, a group of Papua New Guinean islands in the north of the Solomon Archipelago.

Measurements: Holotype H = 2.8 mm, D = 1.5 mm, HW = 1.45 mm, PD = 1.15 mm. Selected paratypic specimens from Bougainville Island: H = 2.9 mm, D = 1.5 mm, HW = 1.5 mm, PD = 1.15 mm; H = 2.9 mm, D = 1.6 mm, HW = 1.4 mm, PD = 1.2 mm; H = 2.75 mm, D = 1.4 mm, HW = 1.4 mm, PD = 1.15 mm; H = 2.6 mm, D = 1.5 mm, HW = 1.5






mm, PD = 1.2 mm. Selected paratypic specimens from Buka Island: H = 3 mm, D = 1.6 mm, HW = 1.7 mm, PD = 1.3 mm; H = 2.7 mm, D = 1.4 mm, HW = 1.4 mm, PD = 1.2 mm; H = 2.7 mm, D = 1.4 mm, HW = 1.5 mm, PD = 1.1 mm.

Description: Shell is small, pale brown, sinistral, conical with conical apex. Shell with 6 convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is slightly ascending, it is about as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well delimited by a short deep impression supplemented with an angulate bulb just beyond the constriction. The constriction situated on same axis with the columellar side of the aperture. The teleoconch is sculptured with delicate, dense, straight ribs. The ribs becoming coarser and 2-2.5x more widely-spaced on the last half whorl. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are slightly oblique to the coiling axis. There are about 11-12 ribs per 0.5 mm. Spiral striae are lacking. The aperture is not tilted against the coiling axis, is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, very thick in lateral view and consists of numerous dense lamellae. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a very broad continuous polished callus. Peristomal margins are not sinuous or the palatal margin of the outer peristome is slightly sinuous. The columella is smooth and shiny, twisted in basal third and then turned down, forming ┐-like columellaris which is visible in the aperture (in certain specimens) in a form of an inconspicuous denticle. The operculum is derivative, in a form of a flying disc, with raised margin and with few concentric lines, provided with short and broad C-like median “handler” on the inner surface.

Differential diagnosis: This species is peculiar in shape of the columella and its ┐-like twisted columellaris (which is visible in the aperture), in very dense axial ribs on the ultimate whorl and due presence of distinctly angulate bulb. The aperture of *Palaina aerari* (Dell, 1955) (Solomon Islands: Nggela, Guadalcanal, Mono) also provided with an inconspicuous columellar callus and an angulate bulb is present on the ultimate whorl in both species. *P. aerari* is larger (3.9 mm compared with 2.6-3 mm in *P. bougainvillei* sp. nov.), axial ribs are much more distant on early teleoconch whorls than on the penultimate and the ultimate ones (in contrast, there are no abrupt changes in axial ribbing pattern in *P. bougainvillei* sp. nov., see plate 31 figs 13-15 & plate 34 figs 1-3) and the penultimate whorl (in apertural view) is somewhat bulbous in *P. aerari* but not in *P. bougainvillei* sp. nov.

Ecology: Specimens found in coconut plantation overgrown by secondary rainforest vegetation as well as in much degraded lowland rainforest, in leaf litter.

Distribution: Solomon Islands archipelago: Bougainville Island, Buka Island.

Conservation status: Data Deficient, DD. This species is known from two localities. Currently not enough data available to calculate current EOO. The current AOO is 8 km^2 but the maximum AOO is likely much higher. The population size and trend are unknown, but *Palaina bougainvillei* sp. nov. is rather abundant in lowland coastal areas of Buka and NW Bougainville. Since this species also inhabits very disturbed vegetation, its population is likely not dramatically affected by deforestation and primary rainforest conversion into gardens. Further research is required in order to clarify distribution, measure population size and highlight threats for this species.

Palaina (s. l.) ***brazieri* (Cox, 1870)** (Plate 34 figs 9-12, map 11)

Material 1 adult MCZ: Palaina brazieri Cox 251224 Kira Kira San Cristoval Solomon Islands Whitney Exp. [handwritten] / Am. MUS. NAT. HIST. [printed] acc. 503 251224 [handwritten] / Mus.Comp.Zoöl., Cambridge, Mass. No. [printed] 251224 Palaina brazieri Cox Kira Kira San Cristoval, Solomon Ids. Whitney exped. [handwritten] Ex. A.M.N.H. Acc. 502 [printed].

Note: Type specimens of this species in the Linnean Society NSW were lost by the great fire of the Garden Palace in September of 1882 (Jude Philp, personal communication). Redescription is based on the specimen from Kira Kira vill., Makira (= San Cristobal) Island.

References: Cox (1870: 84), as *Diplommatina brazieri*; Pfeiffer (1876: 84), as *D.*[*iplommatina*] *Brazieri*; Kobelt & von Möllendorff (1898: 152), checklist, as *Palaina* Subgen. *Palaina* s. str. *brazieri*; Kobelt (1902: 395), as *P.[alaina] (P.[alaina]) brazieri*; Solem (1960: 49); Clench (1965: 5, pl. 2 fig. 4); Gardner (1990: 7).

Measurements: H = 3.5 mm, D = 1.8 mm, HW = 1.8 mm, PD = 1.6 mm.

Description: Shell is large, whitish, dextral, apex is conical. Shell with 6¼ convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture





is rather deeply impressed. The ultimate whorl is as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by a flat broad impression. The constriction is more or less centered in apertural view. The teleoconch is sculptured with very widely-spaced coarse sinuous ribs. There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those of the previous whorls and are oblique to the coiling axis. There are 5-6 ribs per 1 mm. The ribs becoming more distant on the ultimate whorl. Spiral striae are lacking. The aperture is not tilted against the coiling axis, is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double. All margins of the peristome are not sinuous. The inner peristome forms a continuous polished callus which is expanding and covering over a half of the ultimate whorl in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. No specimens were available to study the internal lamellae. Operculum is unknown.

Ecology: According to the original description this species was originally found on wet places in montane areas. Gardner (1990) signals specimens were sampled from leaf litter. San Cristobal Island was initially covered by primary lowland rainforest.

Distribution: Solomon Islands: Makira (= San Cristobal) Island.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. The maximum EOO estimated at least 4000 km^2 taking into account the area of Makira and adjacent islets. The population size and trend are unknown. The main threat for this species is unknown. Further research is required to clarify status of this species in the wild, assess its distribution, population size, trend and highlight threats.

Palaina (s. l.) ***bundiana*** **Wiktor, 1998** (Plate 34 figs 13-15, map 26)

Holotype UWCP: Museum of Nat. Hist., Wroclaw Papua- New Guinea, Prov. Madang. Bundi, near mission (SW of Madang) ca 1400 m a.s.l. Leg.A.Wiktor 23.10.1990 No. 2556 [printed] / Palaina bundiana n.sp. Wiktor Holotypus! Det. et leg. A.Wiktor No. MP 662 [printed] / Holotypus! [printed] / Palaina bundiana A.Wiktor [printed].

Paratype 1 adult UWCP: Museum of Nat. Hist., Wroclaw Papua- New Guinea, Prov. Madang. Bundi, near mission (SW of Madang) ca 1400 m a.s.l. Leg.A.Wiktor 23.10.1990 No. 2556 [printed] / Palaina bundiana n.sp. Wiktor Paratypi Det. et leg. A. Wiktor No MP 662 [printed] / Paratypus! [printed] / Palaina bundiana A.Wiktor [printed].

References: Wiktor (1998: 19).

Measurements: Holotype H = 3.1 mm, D = 1.5 mm, HW = 1.6 mm, PD = 1.05 mm. Paratypic specimen H = 2.8 mm, D = 1.5 mm, HW = 1.4 mm, PD = 0.9 mm.

Description: Shell midsized, whitish to pale rose, sinistral, high conical. Shell with 6½ convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is constricted, it is slightly wider than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is not delimited on shell wall. The teleoconch is sculptured with coarse dense slightly sinuous ribs. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are slightly oblique to the coiling axis. There are 6-8 ribs per 0.5 mm. Spaces between ribs are smooth. The aperture is not tilted against the coiling axis, is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is double, all margins are not sinuous. The inner peristome forms a continuous polished callus. The basal margin of the outer peristome is somewhat reflexed. No specimens were available to study the internal lamellae. The operculum is primitive - circular, transparent, with few concentric lines.

Ecology: This species is reported from abandoned gardens (= degraded lower montane rainforest) on a steep cliff at 1300-1400 m. Specimens observed in very wet conditions under pieces of decaying wood.

Distribution: Eastern New Guinea: Madang Province.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO. The current AOO is 8 km^2, but the maximum AOO is likely much higher. The population size and trend are unknown. *P. bundiana* is generally not abundant species which is known from one locality. Threats are unknown but since *P. bundiana* occurs also in degraded rainforest habitats where wet leaf litter is available. Further research is required on distribution of this species, its population size and threats.

Palaina (s. l.) ***carbavica*** **O. Boettger, 1891** (Figs 52, 119-120, plate 34 figs 16-20, maps 7 & 10)

Lectotype SMF: Palaina carbavica Bttgr. Gunung Carbau, Hitu, N.Amboina. [x] D? Ad. Strubell 90. [handwritten] / Senckenberg.Mus. [printed] 105155/01 [handwritten] Frankfurt-M. [printed] Palaina carbavica O.Boettger









Lectotypus! Orig. 1891 T.4 F.5 N-Amboina: Gunung Carbau, Hitu A.Strubell 1890 [handwritten] Sammlung O.Boettger [printed].
Paralectotypes SMF: 5 adults: Palaina carbavica Bttgr. Gunung Carbau, Hitu, N.Amboina. X D? Ad. Strubell 90. [handwritten] / Senckenberg.Mus. [printed] 105156/5 [handwritten] Frankfurt-M. [printed] Palaina carbavica O.Boettger Paratypoide! Orig. 1891 T.4 F.5 N-Amboina: Gunung Carbau, Hitu A.Strubell 1890 [handwritten] Sammlung O.Boettger [printed]. 3 adults: Pal. carbavica Bttg. xxHitu, Amboina [handwritten, label yellow] / Senckenbg.Mus. [printed] 105156/5 [handwritten] Frankfurt-M. [printed] Palaina (Cylindrop.) carbavica O.Bttgr. Paratypen N-Amboina: Gunung Carbau, Hitu A.Strubell 1890 [handwritten] Sammlung O.v.Moellendorff [printed]. 1 adult: Pal. carbavica Bttg. Ema auf Leitimor, S. Amboina. xA. Strubell 90. [handwritten] / Senckenbg.Mus. [printed] 105157/1 [handwritten] Frankfurt-M. [printed] Palaina (Cylindrop.) carbavica O.Bttgr. Paratypus S-Amboina: Ema auf Leitimor A.Strubell 1890 [handwritten] Sammlung O.Boettger [printed]
Additional material: 1 adult KGC: INDONESIA E, Prov. Maluku tengah, Seram N, distr. Seram Utara, Trans-Seram road between Masohi and Sawai, Horale (former Saka) vill. ~7 km SW, river valley, 02°59'15"S, 129°02'37"E, 07.IV.2009, primary lowland rainforest, leg. K.Greķe; 3 adults & 1 subadult KGC, 2 adults & 1 subadult NME: INDONESIA E, Central Moluccas, Lease Islands, Haruku Is., Pelauw vill. 3.3 km S, 03°32'30"S, 128°27'15"E, 150-170 m, 18.VIII.2016, secondary lowland rainforest, leaf litter, leg. L.Wagner; 3 adults, 3 subadults KGC, 3 adults & 1 juv. NME: INDONESIA E, Central Moluccas, Lease Islands, northern arm of Ambon Is., Waai 4 km NW, 03°32'56"S, 128°17'17"E, 300 m, 19.VIII.2016, secondary lowland rainforest, leaf litter, leg. L.Wagner.

References: Boettger O. (1891: 286, pl. 4 fig. 5); Kobelt & von Möllendorff (1898: 133), checklist, as *Palaina* Subgen. *Cylindropalaina* Mlldff. *carbavica*; Kobelt (1902: 394); van Benthem Jutting (1953: 287); Zilch (1953: 14, pl. 5 fig. 78), as *Palaina* (*Cylindropalaina* Moellendorff 1897) *carbavica*; Monk et al. (1997: 395).
Measurements: Selected paralectotypic specimens from Ambon Island: H = 2 mm, D = 1.05 mm, HW = 1 mm, PD = 0.7 mm; H = 1.85 mm, D = 1.2 mm, HW = 1 mm, PD = 0.8 mm; H = 1.8 mm, D = 1.05 mm, HW = 1 mm, PD = 0.8 mm.
Description: Shell is very small, whitish to pale brown, dextral, cylindrical with conical apex. Shell with 6 convex whorls, the 1½ embryonic whorl is microscopically axially striate and with little pits in-between. The suture is rather deeply impressed. The ultimate whorl is slightly narrower than or as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by changes in ribbing pattern (axial ribs becoming denser at the constriction) and presence of a shallow short impression. The constriction is more or less centered in apertural view. The teleoconch is sculptured with fine, dense, straight ribs. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are straight to the coiling axis. There are 11-12 ribs per 0.5 mm. The ribs becoming more widely-spaced on the last half whorl. Spiral striae are very delicate and dense. The aperture is not tilted against the coiling axis, is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a continuous polished callus. The margins of the inner peristome are not sinuous. The columellar margin of the outer peristome is slightly sinuous. The columella is smooth and rather broad, provided with a very large triangular median knob which is directed backwards. The operculum is derivative, circular with concentric ridges on the outer surface.
Ecology: This species inhabits primary and secondary lowland rainforests on limestone soils. Specimens occur in leaf litter on the undersides of fallen leaves and pieces of decaying wood, as well as on limestone rocks.
Distribution: Lease Islands (Central Moluccas): Ambon Island, Haruku Island, Seram Island.
Conservation status: Near Threatened, NT. The current EOO is about 2170 km^2, but the maximum EOO is at least 4000 km^2 considering the total area of Ambon, Haruku and adjacent part of Seram. The current AOO is about 28 km^2, but the maximum AOO estimated higher but definitively below the threshold of 500 km^2. The population size and trend are unknown. However, *P. carbavica* is not uncommon species on Ambon and Haruku. This species is currently known from several localities and inhabits lowland rainforests preferring those on limestone soils. The population is not severely fragmented. Habitat loss is the main threat. Deforestation reasons are forest conversion to gardens, timber use for building construction and for firewood. Expanding settlements require more space and forest is cleared also for new villages. Human population growth is rampant on Lease Islands. On the other hand, interior of Seram is still pristine and mountains of Ambon are not much affected by human activities. There are at least 5 locations. Continuing decline in extent and quality of habitat for this species is documented and projected for two






locations, resulting in the Ambon AOO decline. Here *P. carbavica* can also be found in disturbed forests with partly closed canopy. No decline in AOO is hitherto documented for Haruku and Seram locations. There are no nature conservation areas on Lease islands to protect populations of *P. carbavica*. Further research is required on distribution of this species and population size to be measured. Establishing nature conservation area to protect remaining old-growth forests on Haruku and Ambon is highly recommended.

Palaina (s. l.) ***chrysostoma* E.A. Smith, 1897** (Figs 50-51, plate 35 figs 1-13, map 14)

Syntype 1 adult BMNH: Diplom chrysostoma Smith l. Flores 4000ft. AM.S. 8.67-44. [handwritten] / chrysostoma, Smith l. Flores [handwritten].

Additional material: 2 adults KGC: INDONESIA, Nusa Tenggara, Flores Is., Ranamese Lake, 08°37.235'S, 120°33.554'E, 1295 m, 08.III.2011, primary lower montane rainforest, soil sample No 2, leg. A.Riedel; 1 adult KGC & 1 adult NME: INDONESIA, Nusa Tenggara, Flores Is., Ranamese Lake, 08°37.024'S, 120°33'40"E, 1270 m, 08.III.2011, primary lower montane rainforest, soil sample No 3, leg. A.Riedel. 2 adult KGC & 1 adult NME: INDONESIA, Nusa Tenggara, Flores Is., Gn. Ranaka mt., 08°37.386'S, 120°31.156'E, 1575 m, 10.III.2011, primary lower montane rainforest, soil sample No 11, leg. A.Riedel; 1 adult KGC: INDONESIA, Nusa Tenggara, Flores Is., Tebedo, 08°29.848'S, 119°59.633'E, 525 m, 14.III.2011, primary lowland rainforest, soil sample No 1, leg. A.Riedel.

References: Smith E.A. (1897a: 626); Kobelt & von Möllendorff (1898: 133), checklist, as *Palaina* Subgen. *Eupalaina* Kob. et. Mlldff. *chrysostoma*; Kobelt (1902: 397), as *Palaina (Palaina) chrysostoma*; Rensch B. (1931: 390).

Measurements: Selected syntype H = 6 mm, D = 3.5 mm, HW = 3.1 mm, PD = 2.7 mm. Selected specimens from Lake Ranamese env.: H = 5.3 mm, D = 3.1 mm, HW = 2.9 mm, PD = 2.4 mm; H = 5.2 mm, D = 3.5 mm, HW = 2.9 mm, PD = 2.6 mm; H = 5.1 mm, D = 3 mm, HW = 3 mm, PD = 2.3 mm.

Description: Shell is very large, yellowish brown, dextral, cylindrical, with conical apex. Shell with $7^1/_3$ convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is constricted, about as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well defined by a short shallow impression and suture is deeply impressed over the constriction. The constriction is centered in apertural view or is shifted and situated on same axis with the columellar side of the aperture. A strong bulb developed just beyond the constriction, above the columellar side of the aperture. The teleoconch is sculptured with fine dense slightly sinuous ribs. There are rather abrupt changes in the ribbing pattern from very dense on early whorls to widely-spaced on the (pen)ultimate whorl(s). The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are 21-24 ribs per 1 mm. The ribs becoming 3-4x more distant on the last half whorl. In specimens from Mt. Ranaka the axial ribs are much more widely-spaced on two last whorls than in type specimens or Lake Ranamese material. In other specimens the axial ribs are strongly reduced and very flat on two last whorls. Spiral striae are lacking. The aperture is not tilted against the coiling axis, is circular or oval and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is double, very broad in lateral view, consists of numerous thin lamellae in lateral view. The palatal margins of both peristomes are inconspicuously sinuous. The inner peristome forms a very broad continuous polished callus. The parietal margin of the peristome has a flat callus. The columella is shiny and broad provided with a more or less distinct knob-like columellaris at the base. The columellaris is visible (in most specimens) in the aperture in a form of a very flat callus. The operculum is derivative, circular, on the outer surface with several low internal concentric ridges and one high outer concentric ridge.

Ecology: This species occurs in leaf litter of primary lowland to mid montane rainforests, it is observed at altitudes 525-1575 m.

Distribution: Lesser Sunda Islands: Flores Island.

Conservation status: Near Threatened, NT. The current EOO about 310 km^2 (inclusive ~60 years old records). The maximum EOO estimated about 5000 km^2 taking into account total area of Flores and adjacent Lembata, Alor and smaller islets. The current AOO is 12 km^2. The maximum AOO for this species is definitively below 500 km^2. No information is available on the population size and trend, but this species seems widespread on Flores. This species avoids arid and deforested lowlands. The population is not severely fragmented, but the fragmentation grade is likely to increase. Habitat loss is the main threat. Drivers for it are conversion of the rainforests to gardens, timber collecting and small-scale logging. These activities result in habitat alteration, fragmentation and decline in AOO. Growing human population of Flores combined






with more frequent and longer dry periods caused by global warming and El Niño weather patterns will likely have continued negative effect on the remaining natural rainforests of Flores. Between 2001 and 2014, Flores, its adjacent islands of Lembata, Adonara, Solor and Rinca lost almost 29000 ha of lowland forest (calculated for canopy density over 25% according to the Global Forest Watch (2016)). Human population is not moving from lowlands to montane areas, but wet mountains are threatened by expanding gardens and logging for construction purposes. Considering aforementioned facts, this trend is likely to cause continuing decline in the AOO. There are 4 locations. Continuing decline is projected based on the present trend of forest loss. Further research is required on distribution of this species and its population size. Monitoring is to be performed for the known subpopulations.

Palaina (s. l.) ***citrinella*** **van Benthem Jutting, 1963** (Plate 35 figs 14-16, map 26)

Holotype NMNL: Indonesia, Papua, bij Ajapo aan het Sentanimeer, bos, 1954.11.06 Exp. L.D. Brongersma c.s. 1954-1955 [printed].

References: van Benthem Jutting (1963: 707).
Measurements: Holotype H = 3.5 mm, D = 1.8 mm, HW = 1.9 mm, PD = 1.2 mm.
Description: Shell is large, white or yellowish with brownish apex, sinistral, cylindrical, with blunt apex. Shell with 6 convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is constricted, it is slightly narrower than or as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by a very shallow impression and a zone of denser placed axial ribs. The constriction is more or less centered in apertural view. The teleoconch is sculptured with delicate irregularly dense sinuous ribs. The ribs becoming more widely-spaced on the last half whorl. In fully grown specimens the ribs becoming higher (somewhat lamella-like) near the suture. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are 10-11 ribs per 1 mm. Spiral striae are very delicate. The aperture is not tilted against the coiling axis, is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a narrow continuous polished callus. The margins of the inner peristome are not sinuous. The palatal margin of the outer peristome is slightly sinuous. No specimens were available to study the internal lamellae. Operculum is unknown.
Ecology: Species occurs in lowland rainforests on limestone soil.
Distribution: Northern New Guinea: Lake Sentani.
Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. This species is known from material sampled over 60 years ago from single locality and has not been found again. The type locality is situated near Jayapura, the administrative capital of Indonesian New Guinea. This region is a subject of deforestation and only small patches of natural rainforest vegetation are remaining here. The population size and trend are unknown. Further research is required to clarify the status of *P. citrinella* in the wild, evaluate its population size and highlight threats.

Palaina (s. l.) ***clappi*** **Solem, 1960** (Plate 35 figs 20-22, map 11)

Holotype UMMZ: Palaina clappi Solem HOLOTYPE FLW18, behind Halavo, Florida Id., R.E. Kuntz! 1944 Solomon Is. UMMZ 181755 ~~20495~~ [original correction] [handwritten] / 181755 Holotype [text red] Diplommatinidae *Palaina clappi* Solem, 1960 Solomon Islands; Central; Florida Islands: Halavo Kuntz, R. E., 1944: Dry; 1 University of Michigan Museum of Zoology Mollusk Division [printed, red border].
Paratype FMNH: 55207 [printed] / 55207 FIELD MUSEUM OF NATURAL HISTORY MOLLUSCA: DIPLOMMATINIDAE 1 dry spec. Paratype(s): Palaina clappi Solem, 1960 Sta. RK-55207, Solomon Islands, Florida Island, Halavo, FLW 18 22 Oct 1944, R. Kuntz! Ex University of Michigan Museum of Zoology [printed].

References: Solem (1960: 50, 51, pl. 6 fig. 3).
Measurements: Holotype H = 2.3 mm, D = 1.7 mm, PD = 1.2 mm (HW is not measured since the ultimate whorl is completely hidden under expanding margin of the persitome in apertural view). Paratype H = 2.35 mm, D = 1.9 mm, PD = 1.1 mm.
Description: Shell is small, white or pale brown, sinistral, conical, with broadly conical apex. Shell with 4¾-5 convex whorls, the 2 embryonic whorls are microscopically pitted. The suture is deeply impressed, especially the suture of the ultimate whorl. The ultimate whorl is strongly constricted and widened again at the aperture. The ultimate whorl is narrower than the penultimate whorl in apertural view. The ultimate whorl is strongly shifted upwards. The umbilicus is closed in adult. The constriction is not visible from under the expanded parietal margin of the peristome. The teleoconch is sculptured






with delicate dense slightly sinuous ribs. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are 8-9 ribs per 0.5 mm. Spiral striae are lacking. The aperture is not tilted against the coiling axis, is oval or subquadrangular and has entire apertural rim. The aperture is shifted left against the coiling axis in apertural view. The peristome is simple (the parietal margin is almost straight) with a very broad zone of numerous dense lamellae on the ultimate whorl prior to the peristome. The parietal margin of the peristome is not fully attached to the ultimate whorl. The parietal margin of the inner peristome is strongly expanding and completely overrunning (covering) the ultimate whorl in apertural view. The parietal / columellar junction of the peristome developed in an obtuse angulation. The margins of the peristome are not sinuous. Small flat columellaris is visible deep in the aperture. No specimens were available to study the internal lamellae. The operculum is derivative - in a form of a flying disc, with raised margin, without concentric ridges.

Ecology: Type specimens sampled from leaf litter.

Distribution: Solomon Islands: Nggela (= Florida) Island.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. This species is known from specimens sampled over 70 years ago from single locality. The population size and trend are unknown. Threats for *P. clappi* are unknown. Further research activities are required on this species.

Palaina (s. l.) ***commixta* I. Rensch, 1937** (Fig. 54, plate 36 figs 1-17, map 28)

= *Palaina commixta jacquinoti* I. Rensch, 1937 **syn. nov.** (Plate 36 figs 8-11)

Holotype *P. commixta* MHUB: Malkong [handwritten] / Zoolog. Museum Berlin. [printed] 90949 Palaina commixta I.Rensch. Neu-Pommern Weite Bucht Malkong lg. Schneider. [handwritten] / Zoolog. Museum Berlin. Typus von: [printed] Palaina commixta I. Rensch Arch. Naturg. N.F. Bd.6. H. 4. 1937, S. 604-605 Abb. 42. [handwritten] [label red].

Holotype *P. commixta jacquinoti* MHUB: Zoolog. Museum Berlin. [printed] Palaina commixta jacquinoti I. Rensch * Neu-Pommern Jacquinotbucht Pormea lg. P. Schneider 90953. [handwritten] / Zoolog. Museum Berlin. Typus von: [printed] Palaina commixta jacquinoti I. Rensch Arch. Naturg. N.F. Bd.6 S.605, 1937 [handwritten] [label red].

Additional material: 2 adults, 1 subadult & 2 juv. UF: UF 366585 Mollusca, Diplommatinidae 5 specimen(s) *Palaina* sp.10 Papua New Guinea, East New Britain Province New Britain 12 km N Marmar Village along trail to Pakia Village secondary hill forest 900 meters 5.43187° S 151.45971° E Slapcinsky, J. 25-February-2005 JS-0772 dry FLORIDA MUSEUM OF NATURAL HISTORY / Mollusca 366581; 6 adults, 1 subadult & 6 juv. UF: UF 366580 Mollusca, Diplommatinidae 12 specimen(s) *Palaina* sp. 10 Papua New Guinea, East New Britain Province New Britain Saukale, 13 km NW Marmar Village along trail to Pakia Village primary hill forest 850 meters 5.42551° S 151.45337° E Slapcinsky, J. 28-February-2005 JS-0775 dry FLORIDA MUSEUM OF NATURAL HISTORY / 775 / Mollusca 366580; 1 adult UF: UF 366578 Mollusca, Diplommatinidae 5 specimen(s) *Palaina* sp.10 Papua New Guinea, East New Britain Province New Britain 12 km N Marmar Village along trail to Pakia Village secondary hill forest 450 meters 5.49651° S 151.49027° E Slapcinsky, J. 04-March-2005 JS-0777 dry FLORIDA MUSEUM OF NATURAL HISTORY / JS 777 / Palaina; 5 adults UF: UF 366585 Mollusca, Diplommatinidae 5 specimen(s) *Palaina* Papua New Guinea, East New Britain Province New Britain, Renis Peninsula, E of Galowe Village primary coastal forest 1 meters 5.52071° S 151.48331° E Slapcinsky, J. 06-March-2005 JS-0778 drowned in water > 75% ethanol FLORIDA MUSEUM OF NATURAL HISTORY / 778; 5 adults & 4 juv. UF, 1 adult KGC: UF 366579 Mollusca, Diplommatinidae 12 specimen(s) *Palaina* Papua New Guinea, East New Britain Province New Britain, Renis Peninsula, E of Galowe Village primary coastal forest 1 meters 5.52071° S 151.48331° E Slapcinsky, J. 06-March-2005 JS-0778 dry FLORIDA MUSEUM OF NATURAL HISTORY / Mollusca 366579.

References *P. commixta*: Rensch I. (1937: 604).

References *P. commixta jacquinoti*: Rensch I. (1937: 605).

Measurements: Holotype *P. commixta* H = 2.7 mm, D = 1.5 mm, HW = 1.5 mm, PD = 1.2 mm. Holotype *P. commixta jacquinoti* H = 2.9 mm, D = 1.55 mm, HW = 1.6 mm, PD = 1.2 mm. Specimens from Galowe vill. env. H = 3.5 mm, D = 2 mm, HW = 1.3 mm, PD = 1.5 mm; H = 3.1 mm, D = 2 mm, HW = 1.8 mm, PD = 1.4 mm; H = 3.2 mm, D = 2 mm, HW = 1.65 mm, PD = 1.5 mm.

Description: Shell is small, white or pale brown, sinistral, conical, with conical apex. Shell with 5¾ convex whorls, the 1¾-2 embryonic whorls are microscopically pitted. The suture is deeply impressed. The ultimate whorl is constricted, as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is defined by a short shallow impression. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse dense straight or sinuous ribs. On the teleoconch, the ribs are bending counter-clockwise on the peripheries of whorls. The ribs becoming much coarser and more






widely-spaced on the last half whorl. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are straight to the coiling axis. There are 10-11 ribs per 1 mm. Spiral striae are very delicate, dense. The aperture is not tilted against the coiling axis, is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The parietal side of the peristome is attached to the ultimate whorl. The peristome is double, thin in lateral view. The inner peristome forms a continuous polished callus. Peristomal margins are not sinuous or the palatal and columellar margins are distinctly sinuous. The columella is smooth and broad, obliquely twisted in its lower fourth, forming a horizontal columellaris. The columellaris is directed outwards but is not visible in the aperture. The operculum is derivative, circular and transparent, strongly impressed on the outer surface, with irregular low ridge along about the half of the periphery of the inner surface, without concentric lines.

Ecology: Primary and secondary lowland rainforests, leaf litter.

Distribution: Bismarck Archipelago: New Britain Island.

Conservation status: Least Concern, LC. The current EOO is about 40 km^2, but the maximum EOO estimated significantly higher. The current AOO is 12 km^2. This species is abundant in historical material from Jacquinot Bay env. and is not uncommon in recently collected material. *P. commixta* inhabits both primary and disturbed lowland rainforests and is reported from sea level up to 950 m. New Britain is still forested and pristine, especially in its central part. However forests being converted to gardens, especially along coastline and at lower altitudes. The area of New Britain covered by rainforest is decreasing constantly, between 2001 and 2014 about 166000 ha of the rainforest were lost (calculated for canopy density over 25% according to the Global Forest Watch (2016)). But the population of *P. commixta* seems stable during over 90 years and threats cannot be identified.

Palaina (s. l.) ***consobrina*** **van Benthem Jutting, 1963** (Plate 35 figs 17-19, maps 23)

Holotype NMBL: Humboldtbay.

Paratype NMBL: Kali Berap, near Berap, NW of Genjiem, Numbou, 4.XI.1954, Exp. Bongersma [not studied].

References: Bavay (1908: 290), as *Diplommatina papuana*; van Benthem Jutting (1963: 705, pl. 29 fig. 26).

Measurements: Holotype H = 3.9 mm, D = 2.7 mm, HW = 2.1 mm, PD = 2 mm. Paratype (according to the original description) H = 4.8 mm, D = 2.7 mm, PD = 2.5 mm.

Description: Shell is large to very large, white or yellowish brown, sinistral, obese, with broadly conical apex. Shell with 6 convex whorls, the 1.5-2 embryonic whorls are microscopically pitted. The suture is deeply impressed. The ultimate whorl is constricted, ascending, about as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well defined by presence of a broad flat impression. The constriction is more or less centered in apertural view. The teleoconch is sculptured with delicate dense strongly sinuous ribs. The ribs are less dense on the ultimate whorl than on preceding ones. The ribs becoming higher, lamella-like near the suture and rise over it. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are strongly oblique to the coiling axis. There are about 10 ribs per 1 mm. Spiral striae are strong but visible on the ultimate whorl only. The aperture is not tilted against the coiling axis, is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, thin in lateral view. A broad zone of numerous dense lamellae present on the ultimate whorl prior to the peristome. The parietal margin of the peristome is not fully attached to the ultimate whorl. The inner peristome forms a continuous polished callus which expands upwards and covering most of the ultimate whorl in apertural view. Peristomal margins are not sinuous, just the palatal margin is somewhat sinuous. No specimens were available to study the internal lamellae. Operculum is unknown.

Ecology: Unknown.

Distribution: Northern New Guinea: near Jayapura and Lake Sentani.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. This species is known from two specimens sampled over 70 years ago from two localities. No information is available on the population size and trend. Further basic research is required on this species.

Palaina (s. l.) ***cupulifera*** **van Benthem Jutting, 1963** (Plate 35 figs 23-25, map 26)

Holotype NMNL: Schouten Islands, E of Biak, Bosnik, on coral rockNear sago swamp, Toxopeus, L.J., 1938.06.16.





References: van Benthem Jutting (1963: 704, pl. 29 fig. 25).
Measurements: Holotype H = 4.5 mm, D = 3.1 mm, HW = 2.5 mm, PD = 2.3 mm.
Description: Shell is very large, white, sinistral, very obese, with flattened apex. Shell with 6 rather flat whorls, the 1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is ascending, about as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is not delimited on shell wall. Teleoconch sculpture on first two whorls consists of very conspicuous axial ribs. Those ribs are very widely-spaced and curved backwards in a form of large, cup-shaped pits. The rest of teleoconch is covered with widely-spaced sinuous ribs. There are abrupt changes in the ribbing pattern from strongly curved on the early whorls to dense on the younger ones. The ribs are not synchronized with those of the previous whorls and are strongly oblique to the coiling axis. There are about 7 ribs per 1 mm. Spiral striae are delicate. The aperture is not tilted against the coiling axis, is circular and has entire apertural rim. The aperture is shifted left against the coiling axis in apertural view. The peristome is double, with several flat circular lamellae between the inner and outer peristome. The ultimate whorl provided with numerous dense lamellae prior to the peristome. The peristome expands and overruns (covering) the ultimate whorl in apertural view. The parietal margin of the peristome is not fully attached to the ultimate whorl. The inner peristome forms a continuous polished callus, which expands upwards and covers most of the ultimate whorl in apertural view. Peristomal margins are not sinuous. No specimens were available to study the internal lamellae. Operculum is unknown.
Ecology: Specimens were sampled in a swampy area on limestone soil.
Distribution: Cenderawasih Bay: Biak Island.
Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. The maximum EOO for this species estimated 7800 km^2 taking into account the area of Biak, Supiori, Numfoor and adjacent islets. This species is known from two specimens sampled over 80 years ago from one locality. Biak is widely known by high proportion of endemic molluscs (e.g. van Benthem Jutting 1963). No information is available on the population size and trend for *P. cupulifera*. Threats are not known. Further basic research is required on this species.

Palaina (s. l.) ***dianctoides*** **sp. nov.** (Plate 36 figs 18-24, map 22)
http://zoobank.org/31EECAA7-BBB1-4FE5-8FAA-162D7D25F6D0
Holotype NME: INDONESIA E, West Papua, Onin Peninsula, Fak-Fak 40-42 km NE, between Kokas & Goras vill., 2°43'19"S, 132°37'57"E, 0-10 m, 27.IX.2010, primary lowland rainforest on limestone, limestone cliff, leg. K.Greķe.
Derivatio nominis: This name should point on conchological similarity with representatives of the diplommatinid genus *Diancta* Martens, 1864.
Measurements: Holotype H = 3.95 mm, D = 2.4 mm, HW = 1.9 mm, PD = 1.85 mm.
Description: Shell is large, orange brown, dextral, high cylindrical with conical apex. Shell with 6 convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. The penultimate whorl is bulbous. The ultimate whorl is constricted, slightly ascending and distinctly narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well defined by presence of a deep broad impression supplemented with a zone of denser placed axial ribs. There is a strong bulb just beyond the constriction above the columellar side of the aperture. The constriction is situated close to the columellar axis of the aperture. The teleoconch is sculptured with moderately coarse, dense, straight or slightly sinuous ribs. There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those of the previous whorls and are oblique to the coiling axis. There are 15-16 ribs per 1 mm. The ribs becoming twice more widely spaced on the last half whorl. Spiral striae are very delicate, dense. The aperture is not tilted against the coiling axis, is circular and has entire apertural rim. The aperture is shifted right against the coiling axis in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is double, very thick in lateral view and consists of numerous dense lamellae. Peristomal margins are not sinuous. The inner peristome forms a continuous polished callus, expands strongly and covers over a half of the ultimate whorl in apertural view. The outer peristome is broadly discontinued parietally. Because only one specimen was available for study, I did not damage the shell to study the internal lamellae. The operculum is derivative - circular, flat, with several low concentric ridges on the outer surface.
Differential diagnosis: This species is unique within *Palaina* due to the combination of the follow-






ing characters: shell is large, the penultimate whorl is bulbous, wider than the ultimate whorl, very strong postconstriction bulb is presents, the inner peristome expands into a very broad continuous callus, the parietal margin of the inner peristome covers most of the ultimate whorl in apertural view, the operculum is without concentric ridges or raised margin.

Ecology: The single specimen was found on coastal limestone cliff in primary lowland rainforest about 20 m from the sea shore.

Distribution: New Guinea: Onin Peninsula.

Conservation status: Data Deficient, DD. Not enough data available to calculate current and maximum EOO. The current AOO is 4 km^2, the maximum AOO is likely much higher. No information is available on the population size and trend. Threats are unknown for this species. Further basic research is required.

Palaina (s. l.) ***diepenheimi*** **(Preston, 1913) comb. nov.** (Plate 37 figs 1-7, map 6)

Lectotype BMNH [herewith designated]: Diancta diepenheimi Pre[ston] Beilan – Beilan Isl. Moluccas (Type in tube). 1914.1.4.435-1944.5.8.1-3 [handwritten] / Type. [printed] / diepenheimi Preston. Dutch. E. Indies. [handwritten].

Paralectotypes 3 adults BMNH [herewith designated]: same labels as lectotype.

Additional material: 1 adult MHUB: 63794 [handwritten] / Zoolog. Museum Berlin [printed, text underlined] Diancta diepenheimi Prest. 1913 Isd. of. Beilan-Beilan Moluccen [sic!] Preston 63794 [handwritten]; 1 adult ZSM: Zoolg. Staatssammlg. München, Abt. Wirbellose Tiere [underlined] Diancta tiessenhauseni Prest. Ins.Beilan-Beilan Typ. [printed] / 6.4. [handwritten].

Lectotype designation: Lectotype is selected from four syntypes, all with same labels.

Notes: This species is lacking typical characters of *Diancta* Martens, 1864 (e.g. bulbous penultimate whorl, presence of longitudinal parietalis). Consequently I decided to move it to *Palaina* (s. str). The lectotype is selected from a series of 4 syntypes all with the same labels.

References: Preston (1913: 438), as *Diancta diepenheimi*.

Measurements: Lectotype H = 3.2 mm, D = 1.7 mm, HW = 1.4 mm, PD = 1 mm. Selected paralectotype specimens: H = 3.1 mm, D = 1.6 mm, HW = 1.5 mm, PD = 1.1 mm; H = 2.8 mm, D = 1.7 mm, HW = 1.4 mm, PD = 1 mm.

Description: Shell is small to moderately large, whitish to pale brown with darker protoconch, dextral, high cylindrical with convex apex. Shell with 5½-6½ moderately convex whorls, the 1½ embryonic whorl is smooth. The suture is rather deeply impressed. The ultimate whorl is constricted, narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well defined by a short distinct impression. The constriction situated on same axis with the palatal side of the aperture (exception is one paralectotype in which the constriction is centered on the apertural side). The teleoconch is sculptured with coarse widely-spaced, slightly sinuous axial ribs on the early and the central whorls. The ribs becoming more widely-spaced on the last half whorl. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are 8 ribs per 1 mm, but 9-10 ribs over the aperture. Extremely delicate and dense spiral striae are present on teleoconch whorls (one paralectotype has very distinct striation). The penultimate whorl has the upper and lower margins parallel or almost parallel in apertural view. The aperture is tilted about 5-10° to the coiling axis and is circular and has entire apertural rim. The aperture is shifted right against the coiling axis in apertural view. The parietal margin of the peristome is completely or not completely attached to the ultimate whorl. The peristome is double, thin in lateral view. The inner peristome forms a continuous polished callus. The palatal margins of both peristomes are sinuous. No specimens were available to study the internal lamellae. Operculum is unknown.

Ecology: Unknown. Belangbelang Island is covered by primary lowland rainforest on limestone soil.

Distribution: Southernmost North Moluccas: Belangbelang Island of Obi Islands group. Almost certainly this species should be found on other islands of Obi group, particularly on limestone Obilatu Island.

Conservation status: Data Deficient, DD. *Palaina diepenheimi* is known from type series collected over 100 years ago from single locality. No enough data available to calculate current EOO and AOO. The area of Belangbelang Island is 7 km^2. The total area of all Obi Islands is about 5100 km^2. It is very unlikely *P. diepenheimi* occurs all over Obi Islands (especially not on distant Gomumu and Tobalai) and only small fractions of Obi rainforests are located on limestone soils. Consequently, the maximum EOO for this species is certainly below 5000 km^2. The main threat for this species is unknown. Belangbelang Island is uninhabited, but all neighbouring islands (small Bisa, Obilatu, Tapat and large





Obira) are. The area of Obi Islands covered by rainforest is decreasing constantly, between 2001 and 2014 about 11000 ha of the rainforest were lost (calculated for canopy density over 25% according to the Global Forest Watch (2016)). Additional research on Obira Island carried out by the University of Florida (2008), as well as on Bisa and Obira islands by the Entomological Society of Latvia (2011, 2013) gave no result for this species. The population of *P. diepenheimi* is likely small or restricted to Belangbelang and, possibly, Obilatu and Tapat islands. Additional research is required on Belangbelang to clarify population size. Further efforts are required to discover populations of *P. diepenheimi* on Obilatu and Tapat, as well as on Obira.

Remark: A specimen labelled as "*Diancta tiessenhauseni*" in ZSM is conspecific with *Palaina diepenheimi*, is coming from the locus typicus of it and was certainly collected together with the syntypes.

Palaina (s. l.) ***doberai*** **sp. nov.** (Fig. 53, plate 36 figs 25-27, map 24)

http://zoobank.org/5B05B3A9-7546-4A43-9C4D-51765AB399D9

Holotype NME: INDONESIA E, W New Guinea, Doberai Peninsula, Ayamaru vill. ~15,5-14 km N, 1°08'04"S, 132°10'59"E to 1°09'29S, 132°11'30"E, ~275-250 m, 02.IX.2015, primary lowland rainforest on limestone, leaf litter, leg. D.Telnov.

Paratypes 4 adults KGC: same label as holotype.

Derivatio nominis: Toponymic. Named after Doberai or the Bird's Head Peninsula of New Guinea where this species occurs. Noun in apposition, invariable.

Measurements: Holotype H = 2.9 mm, D = 1.5 mm, HW = 1.6 mm, PD = 1.3 mm. Selected paratypic specimens: H = 2.8 mm, D = 1.55 mm, HW = 1.6 mm, PD = 1.25 mm; H = 2.75 mm, D = 1.5 mm, HW = 1.4 mm, PD = 1.2 mm; H = 2.7 mm, D = 1.5 mm, HW = 1.65 mm, PD = 1.3 mm.

Description: Shell is small, whitish (body yellow), sinistral and rather broadly conical with convex apex. Shell with 6 convex whorls, the 1¼ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is strongly constricted, about as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by presence of a shallow impression and a zone of denser placed axial ribs. The constriction is more or less centered in apertural view or is situated on same axis with the columellar side of the aperture. The teleoconch is sculptured with delicate rather dense straight axial ribs. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are 6-7 ribs per 0.5 mm. Spiral striae are lacking. The aperture is tilted about 10-15° to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double. The parietal margin of the peristome is attached to the ultimate whorl. The outer peristome is broadly discontinued parietally. The peristome is broad and consists of numerous dense lamellae in lateral view. The inner peristome forms a continuous polished callus. The palatal margins of the inner (stronger) and the outer (less strong) peristomes are sinuous. The columellar margins of both peristomes are sinuous. The columella is smooth and bulbous, provided with a large median knob which is directed backwards. The operculum is primitive - without ridges and impressed on the outer surface.

Differential diagnosis: This species is peculiar among all congeners due to the combination of the following characters: yellow body, large aperture, two last whorls almost equally broad in apertural view, the columella is provided with a large backwards-directed median knob, axial ribs are straight.

Ecology: Specimens were collected from leaf litter in primary lowland rainforest on limestone.

Distribution: New Guinea: lowlands of Doberai Peninsula.

Conservation status: Near Threatened, NT. Not enough data available to calculate current EOO. The maximum EOO for this species estimated 8-10000 km^2 taking into account its estimated distribution (based on limestone soils map for this region). The current AOO is 4 km^2, but the maximum AOO is significantly larger. The population size and trend are unknown, but this species was found on only one site in the large area. Habitat loss and alteration caused by logging, mining, and conversion of forests into gardens and plantations, as well as the expansion of human settlements in lowland areas considered the main threats. The forested part of the maximum EOO is decreasing constantly, between 2001 and 2014 over 10000 ha of the rainforest were lost (calculated for canopy density over 25% according to the Global Forest Watch (2016)). Continuing decline in extent and quality of habitat is observed and projected for *P. doberai* sp. nov. Taking into account constantly growing human population of Doberai Peninsula, this trend is likely to continue. Further research is required in order to clarify population size and trend for this species.






Palaina (s. l.) ***dohertyi* E.A. Smith, 1897** (Fig. 55, plate 37 figs 8-21, map 24)

Lectotype BMNH [herewith designated]: Pali~~a~~aina [original correction] ~~Dohertyi, Smith ? Types~~ [correction on the label] Kapaur N. Guinea novoguineensis Smith TYPES 1897.4.30.53-6 [handwritten] / ~~Dohertyi~~, [correction on the label] Smith Kapaur New Guinea [handwritten] / Type. [printed].

Paralectotypes 3 adults BMNH [herewith designated]: same labels as lectotype.

Additional material: 1 adult FMNH: 72772 [printed] / 72772 FIELD MUSEUM OF NATURAL HISTORY MOLLUSCA: DIPLOMMATINIDAE 1 dry spec. Possible Syntype(s): Palaina dohertyi E.A. Smith, 1897 Sta. FMNH72772, Indonesia, West Papua, New Guinea, Kapaur ex F.F. Laidlaw ex H. Fulton (Acc.# 11666) [printed]; 8 adults KGC, 5 adults & 1 subadult NME: INDONESIA E, West PAPUA, Onin Peninsula, Fak-Fak 10 km E, 2°56'32"S, 132°23'01"E, Sakarteman vill. 1-4 km W, River Sakarteman valley, 350-450 m, 26.IX.2010, primary lowland rainforest on limestone, leg. K.Greķe.

Lectotype designation: Lectotype is selected from a series of 4 syntypes, all with the same labels.

Note: Originally labelled '*Palaina dohertyi*'. 29.1.1962 note from Dr. Whitehead reads 'These shells are not *dohertyi* but probably *novoguieneensis* described at the same time'. 24.9.1962 note from van Benthem Jutting reads 'These shells are certainly *Palaina dohertyi* and not *novoguineensis*. The latter is dextral and more obese. However the notations of the figures in the paper were reversed, *dohertyi* being pl. 9, fig. 32-33 and *novoguieneensis* on pl. 9, fig. 30-31'. I herewith re-confirm that according to the original description, four shells of '1897.7.30.53-56' belong to *Palaina dohertyi* but the figures in the original descriptions of both *P. dohertyi* and *P. novoguieneensis* were reversed

References: Smith E.A. (1897b: 418, pl. 9 figs 32-33 not 30-31); Kobelt & von Möllendorff (1898: 132), checklist, as *Palaina* Subgen. *Eupalaina* Kob. et. Mlldff. *dohertyi*; Kobelt (1902: 398), as *Palaina (Palaina) dohertyi*; van Benthem Jutting (1963: 703).

Measurements: Lectotype H = 2.9 mm, D = 1.7 mm, HW = 1.4 mm, PD = 1.4 mm. Selected specimens from River Sakarteman valley: H = 2.95 mm, D = 1.9 mm, PD = 1.1 mm; H = 2.95 mm, D = 1.8 mm, PD = 1 mm; H = 2.8 mm, D = 1.6 mm, PD = 1.3 mm; H = 2.9 mm, D = 1.6 mm, PD = 1.3 mm.

Description: Shell is small, white with yellow 2-4 first whorls, sinistral, narrow and high conical. Shell with 8 convex whorls, the 1¾ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is constricted, narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well defined by presence of a short shallow impression and changes in ribbing pattern (The ribs becoming less conspicuous and lower in the constriction). The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse widely-spaced strong and high humped and sinuous lamella-like axial ribs. The ribs becoming very widely-spaced on the last half whorl. There are abrupt changes in the ribbing pattern at the constriction area (see above). The ribs are partially synchronized with those of the previous whorls and are oblique to the coiling axis. There are 4 ribs per 0.5 mm. Spiral striae are very delicate and dense. The aperture is tilted about 15° to the coiling axis and is circular and has entire apertural rim. In apertural view the position of the aperture is more or less central below the coiling axis or slightly shifted left. The peristome is double, very broad and expanding in lateral view but less strong in certain specimens. Laterally the peristome consists of numerous dense lamellae. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a continuous polished callus. Both the inner and outer peristomes are not sinuous or slightly sinuous on the palatal margins. The columella is shiny, provided with a flat and long median knob which is directed backwards. The operculum is derivative, moderately high, consists of several layers of concentric ridges and with a broad, spatula-like median "handler" on the inner surface.

Ecology: This species found in primary lowland rainforests on limestone in leaf litter on the undersides of fallen leaves. Reported from altitudes up to 450 m.

Distribution: New Guinea: Onin Peninsula. Record from Aru Islands (Vermeulen 1996c) is based on misidentified specimen of *Palaina vermeuleni* sp. nov. (see description of this species below).

Conservation status: Data Deficient, DD. This species is known from type series sampled over 100 years ago from single locality and from a small recently sampled material. Not enough data available to calculate current EOO. The current AOO is 4 km^2 but the maximum AOO is likely much higher. The population size and trend are unknown. Onin Peninsula is still very pristine and only coastal areas are affected by development. Additional research is required on distribution, population size and trend and threats to be highlighted.







Palaina (s. l.) ***erythropeplos* van Benthem Jutting, 1958** (Plate 36 figs 28-30, map 16)

Holotype NMNL: Indonesia, Papua, Misoöl, Fakal, 0-75 m Lieftinck, M.A. 1948.10.07 [printed].

References: van Benthem Jutting (1958a: 295, 314); van Benthem Jutting (1963: 703).

Measurements: Holotype H = 3.7 mm, D = 2.5 mm, HW = 2.4 mm, PD = 1.3 mm. Selected paratypic specimens (according to the original description): H = 4 mm, D = 2.5 mm, PD = 1.3 mm; H = 3.8 mm, D = 2.6 mm, PD = 1.4 mm; H = 3.6 mm, D = 2.4 mm, PD = 1.1 mm.

Description: Shell is large, thin, pink or yellowish, sinistral, cylindrical, with flattened apex. Shell with 5¼-5½ strongly convex whorls, the 2 embryonic whorls are microscopically pitted. The suture is deeply impressed. The ultimate whorl is wider than the penultimate whorl in apertural view. The protoconch is placed oblique on the rest of the shell. The umbilicus is narrowly open in adult. The constriction is not delimited on shell wall. The teleoconch is sculptured with coarse dense straight ribs. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls. The ribs range from straight to slightly oblique to the coiling axis, except the ultimate whorl which has oblique ribs. There are 9 ribs per 1 mm. Spiral striae are very delicate. The aperture is not or slightly tilted against the coiling axis, is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is double, thick and consists of several strong lamellae in lateral view. Peristomal margins are not sinuous. No specimens were available to study the internal lamellae. Operculum is unknown.

Ecology: Unknown. Misool Island is covered by lowland rainforests on limestone soils at locus typicus of this species.

Distribution: Raja Ampat Islands: Misool Island.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. The maximum EOO estimated below 2000 km^2 taking into account the area of Misool Island and available habitat. The maximum AOO estimated below 500 km^2. The population size and trend are unknown, this species was not found since 1948. *Palaina erythropeplos* was not uncommon species in northern part of Misool according to its original description. This species was reported from three localities in rainforests on limestone soils. Threats for this species are unknown. Misool Island is still very pristine and covered by primary rainforests for over 75%. However, human population is growing and local development is ongoing especially because of establishing new administrative division on Misool (in order to attract funding). Hitherto no large scale deforestation recorded on Misool, but some areas (for example near Lilinta vill. in the SE) suffered from illegal logging over a decade ago. Further basic research is required.

Palaina (s. l.) ***extremita* sp. nov.** (Fig. 56, plate 37 figs 22-28, map 26)

http://zoobank.org/6508CE47-6803-4DE0-89A9-33D64D7CCB61

Holotype UF (No 508073): UF 306120 Diplommatinidae 35 specimen(s) *Palaina sp. 1* Papua New Guinea, Milne Bay Province waterfall on Upalai Creek, 3 km WNW of Watunoa rainforest 60 meters 10°19.645' S 150°34.608' E Slapcinsky, J. D. 27-February-2003 JS-0615 dry FLORIDA MUSEUM OF NATURAL HISTORY [printed] / Palaina sp 1 [handwritten] / 615 [handwritten] / 306120 [printed].

Paratypes 36 specimens: 23 adults, 1 subadult & 1 juv. UF, 4 adults KGC: same labels as holotype; 4 adults UF: UF 299815 Diplommatinidae 4 specimen(s) *Palaina sp. 1* Papua New Guinea, Milne Bay Province waterfall on Upalai Creek, 3 km WNW of Watunoa rainforest, in leaf litter and under logs 60 meters 10°19.645' S 150°34.608' E Slapcinsky, J. D. 04-April-2002 JS-0497a dry FLORIDA MUSEUM OF NATURAL HISTORY [printed] / 497 [handwritten] / 299815 [printed]; 3 adults UF: UF 299817 Diplommatinidae 3 specimen(s) *Palaina sp. 1* Papua New Guinea, Milne Bay Province Watiho Mountain, W of Naura rainforest, in leaf litter and on ground 345 meters 10°17.121' S 150° 10.933' E Slapcinsky, J. D. 06-May-2002 JS-0517 drowned in water > 75% ethanol FLORIDA MUSEUM OF NATURAL HISTORY [printed] / 517 [handwritten].

Derivatio nominis: This species is named from Latin "extrēmum" [last, end, final], because it inhabits easternmost part of the Papuan Peninsula of New Guinea.

Measurements: Holotype H = 3.2 mm, D = 1.65 mm, HW = 1.7 mm, PD = 1.4 mm. Selected paratypic specimens: H = 3.6 mm, D = 1.8 mm, HW = 1.75 mm, PD = 1.5 mm; H = 3.5 mm, D = 1.7 mm, HW = 1.75 mm, PD = 1.5 mm; H = 3.35 mm, D = 1.8 mm, HW = 1.65 mm, PD = 1.4 mm; H = 3.3 mm, D = 1.6 mm, HW = 1.6 mm, PD = 1.4 mm.

Description: Shell is large, white to pale yellow, sinistral, narrow and high conical with convex apex. Shell with 6 convex whorls, the 1½ embryonic whorl is smooth or finely pitted. The suture is deeply impressed. The ultimate whorl is as wide as or slightly wider than the penultimate whorl in apertural view.






The constriction is poorly defined by a short and shallow impression and a short zone of denser placed axial ribs. The constriction situated on same axis with the columellar side of the aperture. The teleoconch is sculptured with rather coarse widely-spaced (or very widely-spaced on early whorls and on last half whorl) straight axial ribs. The ribs becoming denser on the penultimate whorl but not abruptly. The ribs are not synchronized with those of the previous whorls. The ribs range from straight to slightly oblique to the coiling axis. There are about 12-13 ribs per 1 mm. Spiral striae are very delicate and dense. The aperture is not tilted to the coiling axis and is circular, apertural rim is entire or discontinued parietally (Plate 37 fig. 28). The aperture is more or less centered below the penultimate whorl in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is double (this character is not conspicuous) with a very broad zone of numerous dense lamellae on the ultimate whorl prior to the peristome. The inner peristome forms a broad continuous or discontinuous (Plate 37 fig. 28) polished callus. Peristomal margins are not sinuous. The columella is smooth, glass-like and semitransparent, provided with a very large median knob which is directed backwards. The operculum is primitive - circular, medially transparent, with somewhat thickened periphery and thin median part.

Ecology: Specimens were sampled from leaf litter and under decaying wood in lowland rainforest on limestone. Reported from 60 to 345 m altitudes.

Distribution: East of the Papuan Peninsula: Milne Province.

Conservation status: Near Threatened, NT. Not enough data available to calculate current EOO. The maximum EOO estimated below 10000 km^2 taking into account geographical peculiarities of eastern New Guinea and available habitat. The current AOO is 8 km^2. The maximum AOO is estimated below the threshold of 500 km^2. The population size and trend are unknown, but this species is not uncommon. Habitat loss and alteration considered the main threats as a result of settlements' expansion and gardening, but the real affect on the population is unknown. It is very unlikely there will be strong decline on the EOO or AOO of this species within next 10 years. Further basic research is required.

Palaina (s. l.) ***flavocylindrica*** **sp. nov.** (Figs 57 & 121, plate 37 figs 29-37, map 22)

http://zoobank.org/578CE064-1E36-4790-9B07-0C89CD41A212

Holotype NME: INDONESIA E, West Papua, S Bird's Neck, Kaimana 2-4 km NE, 3°39'26"S, 133°46'21"E, 150-200 m, 19-20.IX.2010, primary lowland rainforest on limestone, leg. K.Greķe.

Paratypes 12 adults KGC & 10 adults NME: same label as holotype; 26 adults KGC, 10 adults NME & 1 LKCNHM: INDONESIA E, West Papua, S Bird's Neck, Kaimana 47 km E, Triton bay, Kamaka (former Warika) vill. env., Lake Kamakawalar and surroundings, 3°46'22"S, 134°12'02"E, 60-310 m, 08.IX.2010, primary lowland rainforest, leg. K.Greķe [one adult is badly broken].

Derivatio nominis: This species is named from the combination of the Latin "flavus" [yellow] and "cylindrus" [cylinder], because of cylindrical yellowish coloured shell.

Measurements: Holotype H = 1.55 mm, D = 0.8 mm, HW = 0.8 mm, PD = 0.6 mm. Selected paratypic specimens from Kaimana: H = 1.5 mm, D = 0.8 mm, HW = 0.8 mm, PD = 0.6 mm; H = 1.4 mm, D = 0.75 mm, HW = 0.8 mm, PD = 0.6 mm. Selected paratypic specimens from Warika vill. env.: H = 1.7 mm, D = 0.8 mm, HW = 0.8 mm, PD = 0.65 mm; H = 1.6 mm, D = 0.8 mm, HW = 0.85 mm, PD = 0.65 mm.

Description: Shell is very small, yellowish with yellow body, sinistral, cylindrical with flattened apex. Shell with 5 convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. The protoconch is placed somewhat obliquely to the rest of the shell. The ultimate whorl is strongly constricted, as wide as the penultimate whorl in apertural view but distinctly narrower than it in basal view. The umbilicus is closed in adult. The constriction is poorly defined on shell wall, the suture is somewhat impressed above the constriction and axial ribs becoming stronger sinuous here. The constriction situated on same axis with the columellar side of the aperture. The teleoconch is sculptured with delicate dense straight ribs. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique with regard to the coiling axis. There are about 16-18 ribs per 0.5 mm. The ribs becoming coarse and 2-3x more distant on the last half whorl. Spiral striae not visible at 80x magnification but are very delicate and dense at 300x (there are 9-10 rows of spiral striae per 30 µm measured above the aperture). The aperture is not tilted against the coiling axis, is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is distinctly double, thick and consists of several dense





lamellae in lateral view. The inner peristome forms a continuous polished callus. The outer peristome is broadly discontinued parietally. The columellar margin of the outer peristome is slightly sinuous. In specimens from Warika vill. the palatal margins of both peristomes are slightly sinuous. The columella is shiny. The operculum is derivative - in a form of a flying disc, with slightly raised margin and without concentric ridges.

Differential diagnosis: This regularly cylindrical species with flattened apex is peculiar due to the lacking of spiral striae which is only visible (very delicate and dense) at 300x magnification and the peristome provided with several lamellae between the inner and outer peristomes (in lateral view).

Ecology: This species occurs in primary lowland rainforests on limestone soils at altitude 150-200 m. Specimens observed in wet leaf litter, under decaying wood and on limestone outcrops.

Distribution: New Guinea: southern part of Bird's Neck Isthmus.

Conservation status: Least Concern, LC. Not enough data available to calculate current EOO. The maximum EOO for this species estimated 19000 km^2 taking into account the area of Bird's Neck Isthmus of New Guinea and available habitat. The current AOO is 8 km^2, the maximum AOO estimated between 500-2000 km^2 considering available habitat, soil types and biogeographical peculiarities of Bird's Neck. The population size and trend are unknown, but this species is very abundant in suitable habitat. Habitat loss and alteration are the main threats. There are two locations. Coastal areas of southern Bird's Neck are being converted into gardens, settlements and gardens are expanding but steep anticlines are still covered by primary forest. One locality is near Kaimana city and can be affected by small-scale logging activities and limestone extraction. The forested part of the maximum EOO is quite stable. I can't project significant decline in EOO or AOO for this species in next 10 years. Additional research is required on distribution, population size and trend for this species. A nature conservation area should be established in order to protect Bird's Neck's fauna.

Palaina (s. l.) ***floridensis*** **Solem, 1960** (Plate 38 figs 10-12, map 11)

Holotype UMMZ: Palaina floridensis Solem FLW 18, behind Halvao, Florida Id., R.E. Kuntz! 1944 Solomon Is. HOLOTYPE UMMZ 181756 [handwritten] / 181756 Holotype [text red] Diplommatinidae *Palaina floridensis* Solem, 1960 Solomon Islands; Central; Florida Islands: Halavo Kuntz, R. E., 1944: Dry; 1 University of Michigan Museum of Zoology Mollusk Division [printed, red border].

Paratypes 4 adults FMNH: 55208 [printed] / 55208 FIELD MUSEUM OF NATURAL HISTORY MOLLUSCA: DIPLOMMATINIDAE 4 dry spec. Paratype(s): Palaina floridensis Solem, 1960 Sta. RK-55208, Solomon Islands, Florida Island, Halavo, FLW 18 22 Oct 1944, R. Kutz! Ex University of Michigan Museum of Zoology [printed].

References: Solem (1960: 50, pl. 6 fig. 2).

Measurements: Holotype H = 2.2 mm, D = 1.3 mm, HW = 1.1 mm, PD = 1 mm.

Description: Shell is small, yellowish to pale brown, sinistral, broadly conical with flattened apex. Shell with 5¼-5¾ convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is rather deeply impressed. The penultimate whorl is somewhat bulbous. The ultimate whorl slightly constricted, ascending, about as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is not or slightly defined by a shallow impression. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse dense straight ribs. The ribs becoming coarser and higher but not more distant on the last half whorl. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are about 15 ribs per 1 mm. Spiral striae are delicate and widely-spaced. The aperture is not tilted against the coiling axis, is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is simple. The ultimate whorl with a broad zone of numerous dense lamellae prior to the peristome. The peristome forms a very broad continuous polished callus which expands and covers more than half of the ultimate whorl. The parietal margin of the peristome is not fully attached to the ultimate whorl. The margins of the peristome are not sinuous. No specimens were available to study the internal lamellae. According to the original description, an inconspicuous columellar callus should be present but was not indicated in studied specimens. The operculum is derivative - in a form of a flying disc, with raised margin, without concentric ridges.

Ecology: Specimens found in rainforest leaf litter.

Distribution: Solomon Islands: Nggela (= Florida) Island.

Conservation status: Data Deficient, DD. This species is known from the type series sampled over 70 years ago from single locality. This species has not been collected again. Not enough data available









to calculate current EOO and AOO. The population size and trend are unknown. Additional research is required in order to uncover species' status in the wild, clarify its distribution, population size, trend, as well as highlight threats.

Palaina (s. l.) ***gardneri*** **Dell, 1955** (Plate 38 figs 1-9, maps 11 & 19)

= *Palaina delli* Clench, 1965 **syn. nov.** (Plate 38 figs 4-7)

Holotype MONZ: Mono Island, ridge above Seveke River.

Holotype *P. delli* MCZ: Holotype Palaina delli Clench ½ mile above the 7th Day Adventist Mission Station - W. Side of Lunga River, Guadalcanal, Solomon Ids 258017 [handwritten] / Holo [handwritten] Type. [printed, label red, glued on the right upper corner of the next label] / Mus.Comp.Zool., Cambridge, Mass. No. [printed] 258017 Palaina delli Clench ½ mi. above the 7th Day Adventist Mission Station, W. Side of Lunga River, Guadalcanal, Solomon Ids. Rec: James R. Hood, 1949! " W. Clench 1/65 Acc 579 [handwritten].

Paratypes *P. delli* 5 adults MCZ: same label as holotype.

New synonymy: It is obviously Clench (1965) overlooked description of *Palaina gardneri* published ten years earlier by Dell (1955), because Clench compared his *P. delli* with non-similar *P. brazieri* (Cox, 1870) instead of conchologically identical *P. gardneri*.

References: Dell (1955: 423, 424); Clench (1965: 6, pl. 2 fig. 5), description of *P. delli*.

Measurements: Holotype *Palaina delli*: H = 4.3 mm, D = 2.5 mm, HW = 2 mm, PD = 1.7 mm. Paratype *Palaina delli*: H = 5.2 mm, D = 2.8 mm, HW = 2.4 mm, PD = 2.1 mm. Holotype *Palaina gardneri*: H = 4.6 mm.

Description: Shell is large, brown to pale brown, dextral, narrowly conical with flattened apex. Shell with 6½ rather flattened whorls, the 1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl ascending, it is about as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by a short zone of denser and stronger sinuous axial ribs. The constriction is more or less centered in apertural view. The teleoconch is sculptured with delicate irregularly dense, slightly sinuous ribs. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are about 9-11 ribs per 1 mm. The ribs becoming very widely-spaced on the last half whorl. Spiral striae are lacking. The aperture is not tilted against the coiling axis, is circular and has entire apertural rim. The aperture is shifted right against the coiling axis in apertural view. The peristome is double, thick and consists of numerous dense lamellae in lateral view. The parietal margin of the peristome is not fully attached to the ultimate whorl. The palatal margins of both peristomes are sinuous in certain specimens. The inner peristome forms a broad continuous polished callus. No specimens were available to study the internal lamellae. The operculum is derivative, with concentric ridges on the outer surface.

Ecology: This species inhabits rainforest leaf litter.

Distribution: Solomon Islands: Mono Island, Guadalcanal Island.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. The maximum EOO for this species estimated about 35000 km^2 taking into account its potential distribution area on the Solomon Islands and available habitat. This species is known from the type series sampled about 50-70 years ago from two distant localities and has not been collected again. The population size and trend are unknown for *P. gardneri*. Threats for this species are unknown. Further research is required to uncover species' status in the wild, calculate its population size, trend and highlight threats.

Palaina (s. l.) ***glabella*** **van Benthem Jutting, 1963** (Plate 37 figs 38-40, map 26)

Holotype NMNL: Papua, Biak, humus, Hollander A. dec.1952.

References: van Benthem Jutting (1963: 709, pl. 30 fig. 31).

Measurements: Holotype H = 3.8 mm, D = 1.7 mm, HW = 2.4 mm, PD = 1.6 mm.

Description: Shell is small, creamy, sinistral, obese with flattened apex. Shell with 6 convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is constricted, slightly wider than the penultimate whorl in apertural view. The umbilicus is closed of very narrowly open in adult. The constriction is defined by a short zone of denser placed axial ribs and suture impressed above the constriction. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse widely-spaced straight ribs. There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those of the previous whorls and are slightly oblique to the coiling axis. There are 6 ribs per 1 mm. The ribs becoming more





widely-spaced on the last half whorl. Spiral striae are very delicate and dense on all the teleoconch whorls. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, the outer peristome is discontinued parietally. The parietal margin of the peristome is attached to the ultimate whorl. The palatal margin of the outer peristome is sinuous. No specimens were available to study the internal lamellae. Operculum is unknown.

Ecology: Specimens found in soil.

Distribution: Cenderawasih Bay: Biak Island.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. The maximum EOO for this species estimated 7800 km^2 taking into account the area of Biak, Supiori, Numfoor and adjacent islets. The maximum AOO estimated below the threshold of 500 km^2. This species is known from a series of specimens sampled about 70 years ago from three close-situated localities. This species has not been collected again. Biak is widely known by high proportion of endemic molluscs (e.g. van Benthem Jutting 1963). The population size and trend are unknown. Threats for this species are unknown. Habitat loss and alteration are significant threats but cannot be validated due to lack of recent material. Further basic research is required.

Palaina (s. l.) ***granulum*** **I. et B. Rensch, 1929**
(Plate 38 figs 13-16, map 28)

Lectotype MHUB [herewith designated]: Zoolog. Museum Berlin [printed] 90945 Palaina granulum I.+B. Rensch * Neu-Pommern Weite Bucht Karlei lg. P. Schneider [handwritten] / Zoolog. Museum Berlin. Typus von: [printed] Palaina granulum I. + B.Rensch Zool. Anz. 80, 1929, p. 86, Abb. 7 [handwritten] [label red].

Paralectotypes 3 adults MHUB [herewith designated]: same labels as lectotype [all paralectotype shells are broken].

Lectotype designation: One of syntypic specimens from „Weite Bucht“ selected as lectotype.

References: Rensch I. & B. (1929: 86); Rensch I. (1937: 604).

Measurements: Lectotype H = 2.1 mm, D = 1.15 mm, HW = 1.25 mm, PD = 1.1 mm. Selected paralectotypes (measurements are identical) H = 2.1 mm, D = 1.2 mm. According to Rensch I. (1937), some specimens of *P. granulum* grow up to H = 2.6 mm, D = 1.4 mm.

Description: Shell is small, whitish to brownish, sinistral, cylindrical with flattened apex. Shell with 6¼ convex whorls, the 1¾ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by a short and shallow impression. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse straight ribs; the ribs are denser on early whorls, widely-spaced on younger whorls. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls. The ribs range from straight to slightly oblique to the coiling axis. There are about 17-18 ribs per 1 mm. The ribs becoming more widely-spaced on the last half whorl. Spiral striae are lacking. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, thick in lateral view and consists of several dense lamellae. The parietal margin of the peristome is attached to the ultimate whorl. Peristomal margins are not sinuous. The inner peristome forms a continuous polished callus. The outer peristome expands beyond the inner one except on the parietal side. The basal margin of the outer peristome is slightly reflexed. No specimens were available to study the internal lamellae. Operculum is unknown.

Ecology: Unknown. New Britain Island was initially covered by primary lowland to mid montane rainforests.

Distribution: Bismarck Archipelago: New Britain Island.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. The maximum EOO for this species estimated 145000 km^2 taking into account the area of New Britain, New Ireland and adjacent islets. This species is known from specimens sampled about 100 years ago from two localities and has not been collected again. The population size and trend for *P. granulum* are unknown, however Rensch I. (1937) stated that this species was found in large number. Threats for this species are unknown. Further basic research is required.

Palaina (s. l.) ***hartmanni*** **sp. nov.** (Figs 58, 122-123, plate 38 figs 17-22, map 21)

http://zoobank.org/F245E03C-3188-4997-AD92-85E553DB4B7A

Holotype NME: INDONESIA E, Raja Ampat, Waigeo Island, Waisai 3 km W, 00°26’04”S, 130°47’41”E, 40-50 m, 17.II.2012, secondary lowland rainforest on lime-









stone, leg. D.Telnov.
Paratypes 49 adults: 9 NME & 13 KGC: same label as holotype; 11 adults NME & 16 adults KGC: INDONESIA E, Raja Ampat, Waigeo Island, Waisai 4,5 km SW, Waiwo dive resort, 00°26'07"S, 130°46'45"E, 10-15 m, 21.II.2012, primary lowland rainforest on limestone, leg. D.Telnov [one adult is badly broken].

Derivatio nominis: Patronymic. This species is named after well-known Himalaya biodiversity researcher, coleopterist, director of the Naturkundemuseum Erfurt and my good friend Matthias Hartmann.
Measurements: Holotype H = 1.75 mm, D = 1 mm, HW = 0.8 mm, PD = 0.8 mm. Selected paratypic specimens: H = 1.8 mm, D = 1 mm, HW = 0.8 mm, PD = 0.8 mm; H = 1.7 mm, D = 1 mm, HW = 0.85 mm, PD = 0.8 mm; H = 1.7 mm, D = 1.05 mm, HW= 0.95 mm, PD = 0.75 mm.
Description: Shell is very small, whitish, yellowish or creamy coloured, sinistral, cylindrical with flattened apex. Shell with 5½ convex whorls, the 1¼ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is constricted, about as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction defined by reduction of axial ribs (the ribs are absent or very low at this area) and by presence of a flat cavity-like impression on the suture above the constriction. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse rather dense straight or slightly sinuous ribs. There are abrupt changes in the ribbing pattern - the ribs becoming 3-4x more distant and stronger on tuba. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are 9 ribs per 0.5 mm. Spiral striae are very delicate and dense. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, consists of several strong lamellae in lateral view. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a continuous polished callus. The outer peristome is broadly discontinued parietally. The palatal margins of both peristomes are sinuous. In fully grown specimens the median part of the palatal margin of the outer peristome is reflexed. The columella is smooth and thin. The operculum is derivative - in a form of a flying disc with slightly raised margin.
Differential diagnosis: This species is distinctive due to very distant axial ribs of the last half whorl. Similar *Palaina sparselamellata* sp. nov. (Waigeo Island; see description of this species below) differs in all the teleoconch whorls covered with very widely-spaced ribs and in operculum provided with a ridge and generally slightly larger shell size than in *P. hartmanni* sp. nov.
Phylogeny: According to results of COI analysis this species represents a separate clade together with another Waigeo species *P. megalostoma* sp. nov.
Ecology: Specimens found in secondary lowland rainforest at altitudes 40-50 m about 150 m from the seashore, in thick stratum of leaf litter accumulated at buttress roots of large trees and near limestone outcrops in very wet places.
Distribution: Raja Ampat Islands: Waigeo Island.
Conservation status: Near Threatened, NT. This species inhabits western peninsula of Waigeo, it is hitherto recorded from single locality in southern part of it. Not enough data available to calculate current EOO. The maximum EOO estimated under 5000 km^2 (the area of Waigeo and adjacent islets considering available habitat). The current AOO is 8 km^2, but the maximum AOO estimated up to 500 km^2 considering available habitat. The population size is unknown, but *P. hartmanni* sp. nov. is rather abundant. This species is connected with wet rainforest litter. The main threats for this species is Habitat loss and alteration due to conversion of the rainforests into gardens, road construction, timber collecting and small-scale logging resulting in habitat alteration, causing fragmentation and decline in AOO. Growing human population of southern Waigeo and increasing tourism in this area (both national and international) demand more gardens, infrastructure and tourism resorts. Waigeo got a regency capital of Raja Ampat administrative province some years ago. This resulted in boosting development, investments into provincial airport and Waisai, the regency capital. Waigeo is initially rich in limestone rocks and limestone is widely used for roads and buildings construction. Growing population (partly a result of immigration from other islands of Indonesia) requires more firewood and charcoal. Illegal logging is rare but is a reality to count with. Aforementioned factors resulted in decline of primary lowland rainforests, especially in SW Waigeo. This trend is observed, estimated and likely to continue. Between 2001-2014 south-western Waigeo lost just about 1100 ha of rainforest (calculated for canopy density over 25% according to the Global Forest Watch (2016)), but almost exactly in the area where *P. hartmanni* sp. nov. occurs. This species was observed in a disturbed forest with closed






canopy (wet litter is the key). Additional research is required to clarify distribution and highlight population trend for *P. hartmanni* sp. nov. It is important to clarify is this species distributed all over Waigeo Island or is limited to southern part of it.

Palaina (s. l.) ***iha*** **sp. nov.** (Figs 60, 100, 106 & 124, plate 38 figs 23-25, map 24)
http://zoobank.org/AA450A84-B6A4-43F0-9709-4BE3695A6672

Holotype NME: INDONESIA E, West Papua, Onin Peninsula, Fak-Fak 5-7 km N, 2°53'26"S, 132°18'22"E, 300-400 m, 23.IX.2010, primary lowland rainforest on limestone, leg. D.Telnov.
Paratype 1 adult KGC: same label as holotype.

Derivatio nominis: Named after Iha, local tribe and language of western Onin Peninsula, the area where this species was found. Noun in apposition, invariable.
Measurements: Holotype H = 1.4 mm, D = 0.7 mm, HW = 0.7 mm, PD = 0.55 mm. Paratype H = 1.35 mm, D = 0.7 mm, HW = 0.7 mm, PD = 0.5 mm.
Description: Shell is very small, white, sinistral, cylindrical with flattened apex. Shell with 5½ convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is rather deeply impressed. The ultimate whorl is constricted, nearly as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is delimited by a short zone free of axial ribs and suture impressed above the constriction. The constriction is more or less centered in apertural view. The teleoconch is sculptured with rather widely-spaced straight (in paratype) or sinuous (in holotype) ribs. The ribs becoming about twice more distant on tuba. There are no abrupt changes in the ribbing pattern except the short discontinuation at the constriction place (see above). The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are about 14-16 ribs per 0.5 mm. Spiral striae are distinct, very delicate and dense (there are 8-9 rows of spiral striae per 30 µm measured above the aperture). The aperture is not tilted against the coiling axis, is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is distinctly double. Few inconspicuous flat lamellae present between the inner and the outer peristomes. The outer peristome is stronger developed than the inner one. The parietal margin of the peristome is attached to the ultimate whorl. The margins of the peristome are not sinuous. The inner peristome forms a continuous polished callus. The outer peristome is broadly discontinued parietally. The columella is glass-like semitransparent. The operculum is primitive, circular without concentric lines of ridges.
Differential diagnosis: This species is similar to several minute Papuan *Palaina*. Its specific characters are discussed in table 13.
Ecology: This species occurs in primary lowland rainforests.
Distribution: New Guinea: Onin Peninsula.
Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO. The current AOO is 4 km^2 but likely is much higher. *Palaina iha* sp. nov. is known from two specimens collected at one locality in primary lowland rainforest. Threats for this species cannot be identified. Onin Peninsula is still very pristine and covered by primary rainforests for over 75%. Further research is required on distribution of this species as well as on population size and threats.

Table 13. Papuan species of *Palaina* s. l. similar to *P. iha* sp. nov. and their distinctive characters.

Species	**Character**	**Character in *P. iha* sp. nov.**
Palaina albrechti sp. nov.	no interruption in ribbing pattern at the constriction	a short zone free of axial ribs at the constriction
P. biroi	the operculum with low concentric ridges and shallow median impression on the outer surface	the operculum without ridges and impression
P. flavocylindrica sp. nov.	axial ribbing pattern not discontinued at the constriction	a short zone free of axial ribs at the constriction
P. insulana sp. nov.	H = 1.8-1.95 mm, axial ribbing pattern not discontinued at the constriction, the peristome is triple, rather broad in lateral view and consists of dense lamellae, the outer peristome not or slightly stronger than the inner one	H = 1.35-1.4 mm, short zone free of axial ribs at the constriction, few flat lamellae between the inner and the outer peristome, the outer peristome stronger than the inner one






P. lengguru sp. nov.	there are abrupt changes of the axial ribbing pattern - starting from the constriction the ribs becoming coarser and 2x more widely-spaced on the last half whorl	axial ribbing pattern changes evenly starting from the constriction
P. minuscularia sp. nov.	axial ribs delicate and rather low, about 25-28 ribs per 0.5 mm, the columella with basal knob, 4 rows of spiral striae per 30 µm (measured above the aperture), axial ribbing pattern is not discontinued at the constriction	axial ribs rather high and coarse, about 14-16 ribs per 0.5 mm, the columella a simple lamella, 8-9 rows of spiral striae per 30 µm (measured above the aperture), a short zone free of axial ribs at the constriction
P. waigeo sp. nov.	5-6 rows of spiral striae per 30 µm (measured above the aperture), axial ribbing pattern not discontinued or discontinued (in one paratype) at the constriction, there are abrupt changes in the ribbing pattern - starting from the constriction the ribs becoming coarser and twice more distant	8-9 rows of spiral striae per 30 µm (measured above the aperture), a short zone free of axial ribs at the constriction, axial ribbing pattern changes evenly starting from the constriction

Palaina (s. l.) ***imperfecta*** **sp. nov.** (Fig. 61, plate 47 figs 14-16, map 20)

http://zoobank.org/A9C1B5A1-F821-40C5-A3CB-ED56DDF479D8

Holotype LKCNHM: Indonesia: West Papua [sic!], Waigeo, Lopintol, Gua Kalepale, Leg. T. Whitten, Jan 2013.

Derivatio nominis: Named from Latin “imperfectus” [not perfect, not finished] since this species is small and was only represented with a single specimen for this study.

Measurements: Holotype H = 1.75 mm, D = 1.2 mm, HW = 1 mm, PD = 0.7 mm.

Description: Shell is very small, yellowish, sinistral, cylindrical with conical apex. Shell with 5¼ convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is rather deeply impressed. The ultimate whorl is strongly constricted, ascending; it is as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The protoconch is placed oblique on the rest of the shell. The constriction is well defined by deeply impressed suture above the constriction and by a zone of twice denser axial ribs. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse widely-spaced straight axial ribs. The ribs becoming twice sparser on the two last whorls. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are 9-10 ribs per 0.5 mm. Spiral striae are lacking at 80x magnification. The aperture is not of slightly tilted to the coiling axis and is ovoid and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is triple, thick in lateral view. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a broad continuous polished callus, with two obtuse ear-like protrudings near the palatal / parietal and the parietal / columellar junctions. Both the palatal and columellar margins of the inner peristome are sinuous. The columella is smooth. Operculum is unknown.

Differential diagnosis: This species is most closely related with *P. laszloi* sp. nov. (Wayag Island NW of Waigeo) and *P. wawiyai* sp. nov. (Waigeo Island), but differs primarily in much smaller shell and in simple columella which is not widened and not provided with a knob.

Ecology: Unknown.

Distribution: Raja Ampat Islands: Waigeo Island. Co-ordinates of Gua [cave] Kalepale are 00°17’18”S, 130°49’15”E, but no information is available where exactly this specimen was sampled.

Conservation status: Data Deficient, DD. This species is known from single specimen collected under unknown circumstances and the habitat is unknown. Not enough data available to calculate current EOO. The maximum EOO estimated over 65 km^2 taking into account the Lopintol vill. and adjacent area of West Waigeo. The current AOO is 4 km^2, the maximum AOO is certainly under 500 km^2. The population size and trend are unknown. Threats for this species are unknown. Further research is required primarily on distribution and habitat requirements of *P. imperfecta* sp. nov.

Palaina (s. l.) ***inconspicua*** **van Benthem Jutting, 1963** (Plate 38 figs 29-31, map 27)

Holotype NMNL: Papua, Biak, Zuid-Biak, Owi, Brongersma & Roosdorp, 1952.04.06.

References: van Benthem Jutting (1963: 708, pl.





29 fig. 30).
Measurements: Holotype H = 2.7 mm, D = 1.7 mm, HW = 1.5 mm, PD = 1.3 mm. Selected paratypic specimens (according to the original description): H = 2.5 mm, D = 1.5 mm, PD = 0.9 mm; H = 2.7 mm, D = 1.6 mm, PD = 1.2 mm.
Description: Shell is small, whitish to brownish, sinistral, obese with flattened apex. Shell with 5 strongly convex whorls, the 1 embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is constricted and slightly ascending; it is about as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by a broad shallow impression. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse dense straight ribs. There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those of the previous whorls and are oblique to the coiling axis. There are about 13-14 ribs per 1 mm. The ribs becoming more widely-spaced on the last half whorl. Spiral striae are lacking. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, very thick and consists of numerous dense lamellae in lateral view. The parietal margin of the peristome is completely attached to the ultimate whorl. The inner peristome forms a very broad continuous polished callus which expands and covers about a half of the ultimate whorl in apertural view. Peristomal margins are not sinuous. No specimens were available to study the internal lamellae. Operculum is unknown.
Ecology: Unknown.
Distribution: Cenderawasih Bay: Owi Island. Possibly extant also on Biak Island.
Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. The maximum EOO estimated 7800 km^2 taking into account the area of Owi, Biak, Supiori, Numfoor and adjacent islets. The maximum AOO estimated less than 500 km^2. This species is known from a series of specimens sampled about 70 years ago from single locality. Cenderawasih Bay islands are widely known by high proportion of endemic molluscs (e.g. van Benthem Jutting 1963). No information is available on the population size and trend. Threats for this species are unknown. Habitat loss and alteration considered important threats but cannot be validated, because of lack of data. Further basic research activities are required.

Palaina (s. l.) ***insulana*** **sp. nov.** (Figs 62, 125-126, plate 38 figs 26-28, map 17)
http://zoobank.org/1F2BD7C6-E21B-47D9-BB31-8E6B2F32D4A6
Holotype NME: INDONESIA E, Prov. Raja Ampat, distr. Misool Barat, Lilinta (Lelintah) vill. ~16 km S, Polee (Yfpolee) Island, 02°11'56"S, 130°16'19"E, 02.IV.2009, primary lowland rainforest, leg. K.Greķe.
Paratypes 2 adults & 1 juv. KGC: same label as holotype [one adult is badly broken].
Derivatio nominis: This species was found on a small Polee islet and therefore is named from Latin 'insula' [island].
Measurements: Holotype H = 1.95 mm, D = 1 mm, HW = 1.05 mm, PD = 0.8 mm. Selected paratypic specimen: H = 1.8 mm, D = 0.95 mm, HW = 1 mm, PD = 0.7 mm.
Description: Shell is very small to small, white, sinistral, high cylindrical with flattened apex. Shell with 6 convex whorls, the 2 embryonic whorls are microscopically pitted. The suture is deeply impressed. The ultimate whorl is constricted, about as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by a sutural impression above the constriction. The constriction situated on same axis with the columellar side of the aperture. Teleoconch sculpture on the first 3-4 whorls consists of delicate dense straight ribs. The ribs becoming much coarser and twice more distant on two last whorls. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are about 8-9 ribs per 0.5 mm. Spiral striae are lacking at 80x magnification. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is distinctly triple, thick in lateral view and consists of two large and several delicate lamellae. The parietal margin of the peristome is attached to the ultimate whorl. The outer peristome is broadly discontinued parietally. The palatal margin of the outer peristome is slightly sinuous. The columella is shiny and straight. Operculum is unknown.
Differential diagnosis: Most closely related with *Palaina minuscularia* sp. nov. (Misool Island; see description and differential diagnose of this species below). Also conchologically similar with *P. beilanensis* Preston, 1913 (North Moluccas) from *P. insulana* sp. nov. differs primarily in laterally thicker peristome (in *P. beilanensis* the peristome






is less thick in lateral view), sparser axial ribs on the penultimate and the ultimate whorls and shell less than twice higher than wide (shell is twice higher than wide in *P. beilanensis*).

Ecology: This species occurs in primary lowland rainforests on limestone rocks. Specimens observed in wet leaf litter accumulated in cavities of limestone formations, about 20 m from the sea shore.

Distribution: Raja Ampat Islands: Polee (= Pelee, Yfpolee) Island south of Misool.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO. The maximum EOO estimated below 2000 km^2 taking into account the area of Misool Island and adjacent islets. The current AOO is 4 km^2. The maximum AOO is likely higher. The population size and trend are unknown. *Palaina insulana* sp. nov. is not an abundant species even at its type locality. This species is currently known from single locality and inhabits old-growth lowland rainforests on limestone rock formations. No major threats have been identified for this species. Polee Island is very small (about 1500 ha) and partly consists of pure limestone rocks with no forest on them; it is uninhabited and only rarely visited by fishermen and turtle eggs collectors from S Misool. The islet is very pristine and covered by primary rainforests. Further research is required on distribution of *P. insulana* sp. nov. as well as on population size, trend and threats.

Palaina (s. l.) ***laszloi*** **sp. nov.** (Fig. 63, plate 39 figs 1-4, map 20)

http://zoobank.org/884177F1-754E-43C3-BDB2-7C728D2021EE

Holotype NME: INDONESIA E, Raja Ampat Prov., Wayag Island, along the southern coast, 31.X.2011, leaf debris in forest at the foot of limestone cliff, leg. L.Wagner.

Paratype 1 KGC: same label as holotype.

Derivatio nominis: Patronymic. This species devoted to Laszlo Wagner (Budapest, Hungary; http://www.east-indonesia.info), my friend and famous Indonesia explorer who first collected this species.

Measurements: Holotype H = 2.3 mm, D = 1.4 mm, HW = 1.15 mm, PD = 1 mm. Paratypic specimen: H = 2.1 mm, D = 1.3 mm, HW = 1.1 mm, PD = 1 mm.

Description: Shell is small, yellow, sinistral, broadly fusiform with conical apex. Shell with 5¾-5¼ convex whorls, the 1½-1¼ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is strongly constricted, ascending, nearly as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The protoconch is placed oblique on the rest of the shell. The constriction is well defined by a short zone of less coarse (low) axial ribs and sutural impression above the constriction. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse, widely-spaced, straight axial ribs. The ribs becoming stronger (more high) and lamella-like on the suture. There are no abrupt changes in the ribbing pattern. The ribs are partly synchronized with those of the previous whorls and are oblique to the coiling axis. There are 9-10 ribs per 1 mm. Spiral striae are lacking at 80x magnification. The aperture is not of slightly tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, very thick in lateral view. There is a zone of very dense flat lamellae between the inner and the outer peristome. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a very broad continuous polished callus. Two distinct obtuse ear-like protrudings developed at the palatal / parietal and the parietal / columellar junctions. Both the palatal and columellar margins of the inner peristome are strongly sinuous, of the outer peristome - slightly sinuous. The outer peristome is broadly discontinued parietally. The columella is smooth, provided with a very large knob in basal half (this knob is becoming stronger at base of the columella). The operculum is derivative - circular with a long and medially hollow tube on the outer surface.

Differential diagnosis: This species is distinctive among all congeners due to the combination of the following characters: the inner peristome with two distinct ear-like protrudings (similar like in *Palaina scaveola* van Benthem Jutting, 1958 (Misool Island) and *P. sparselamellata* sp. nov. (Waigeo Island; see description of this species below), the columella is provided with a large median knob. Also very similar with *P. wawiyai* sp. nov. (Waigeo Island) - see description and differential diagnosis of this species below.

Ecology: This species occurs in primary lowland rainforests at base of the karst hills Wayag is so famous with.

Distribution: Raja Ampat Islands: Wayag Island.

Conservation status: Data Deficient, DD. This species is known from two specimens recently collected on a small and rugged limestone islet covered with primary semidry vegetation. Not enough data available to calculate current EOO. The maximum EOO estimated about 1850 km^2 taking into







account the area of Wayag, adjacent islets and NW Waigeo. The current AOO is 4 km^2, the maximum AOO is certainly under 500 km^2. Threats are unknown as the population size and trend are. Further basic research is required.

Palaina (s. l.) ***lengguru*** **sp. nov.** (Figs 65-66, 101 & 104, plate 39 figs 5-11, map 24)

http://zoobank.org/724DAB2A-23BC-4A2C-A394-630747635C99

Holotype NME: INDONESIA E, West Papua, S Bird's Neck, Kaimana 40 km E, Triton Bay, Lobo vill. & env., 3°45'33"S, 134°06'11"E, 15-150 m, 11-12.IX.2010, primary rainforest on limestone, leg. K.Greke.

Paratypes 59 adults KGC, 20 adults NME, 2 LKCNHM & 3 SMF: same label as holotype.

Derivatio nominis: Toponymic. This species was discovered in vast rainforests of Lengguru river valley and is named after this scenic river. Noun in apposition, invariable.

Measurements: Holotype H = 1.35 mm, D = 0.75 mm, HW = 0.75 mm, PD = 0.6 mm. Selected paratypes: H = 1.4 mm, D = 0.8 mm, HW = 0.75 mm, PD = 0.6 mm; H = 1.35 mm, D = 0.8 mm, HW = 0.7 mm, PD = 0.6 mm; H = 1.35 mm, D = 0.75 mm, HW = 0.8 mm, PD = 0.6 mm; H = 1.3 mm, D = 0.75 mm, HW = 0.75 mm, PD = 0.6 mm; H = 1.3 mm, D = 0.75 mm, HW = 0.7 mm, PD = 0.6 mm.

Description: Shell is very small, white with yellow body, sinistral, cylindrical with flattened apex. Shell with 4¾-5 convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. The penultimate whorl is constricted, as wide as the ultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well defined by a short discontinuation in axial ribbing pattern and presence of sutural impression above the constriction. The constriction situated on same axis with the columellar side of the aperture. In most specimens the protoconch is placed oblique on the rest of the shell. The teleoconch is sculptured with delicate dense slightly sinuous axial ribs. There are abrupt changes in the ribbing pattern - the ribs becoming coarser and twice more distant starting from the constriction. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are about 13-15 ribs per 0.5 mm. Spiral striae are very delicate and dense. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, thin in lateral view. The outer peristome is expanding beyond the inner one. The parietal margin of the peristome is attached to the ultimate whorl. Peristomal margins are not sinuous. The inner peristome forms a continuous polished callus. The outer peristome is broadly discontinued parietally. The columella is thin and straight, widening basally towards columellar plate. In certain specimens the columella is visible at the columellar margin of the peristome in a form of an inconspicuous callus. The operculum is derivative - in a form of a flying disc, with slightly raised margin and without concentric ridges.

Differential diagnosis: This species is similar to several minute Papuan *Palaina*. Specific characters are presented in the table 14.

Ecology: This species occurs in primary lowland rainforests at altitudes from sea level up to 150 m. Specimens were observed in wet leaf litter and under decaying wood at base of limestone outcrops.

Table 14. Papuan species of *Palaina* s. l. similar to *P. lengguru* sp. nov. and their distinctive characters.

Species	**Character**	**Character in *P. lengguru* sp. nov.**
Palaina albrechti sp. nov.	axial ribbing pattern changes evenly starting from the constriction	there are abrupt changes in the axial ribbing pattern - starting from the constriction the ribs becoming coarser and 2x more distant
P. beilanensis	shell 2x higher than broad, H ~1.8-2 mm	shell less than 2x higher than broad, H ~1.1-1.3 mm
P. insulana sp. nov.	H ~1.8-1.95 mm, the peristome is rather broad in lateral view, it is triple and consists of several dense lamellae	H ~1.3 mm, the peristome is double, thin in lateral view and consists of a few lamellae
P. biroi	the operculum with low concentric ridges and shallow median impression on the outer surface	the operculum without concentric ridges and without median impression
P. iha sp. nov.	axial ribbing pattern changes evenly starting from the constriction	there are abrupt changes in the axial ribbing pattern - starting from the constriction the ribs becoming coarser and 2x more distant






P. waigeo sp. nov.	shell generally higher, W = 5½, axial ribs denser and slightly oblique to the coiling axis, the outer peristome is comparatively stronger expanded, the columella is not widening basally	shell generally lower, W = 4¾-5, axial ribs more widely-spaced and stronger oblique to the coiling axis, the outer peristome is comparatively less strongly expanded, the columella widening basally

Distribution: New Guinea: southern part of Bird's Neck Isthmus.

Conservation status: Least Concern, LC. Not enough data available to calculate current EOO. The maximum EOO for this species is estimated about 19000 km^2 taking into account the area of Bird's Neck Isthmus of New Guinea and available habitat. The current AOO is 8 km^2, the maximum AOO estimated between 500-2000 km^2 taking into account available habitat, soil types and biogeographical peculiarities of Bird's Neck. The population size and trend are unknown, but this species is locally very abundant. Habitat loss and alteration are the main threats. On southern Bird's Neck coastal areas are being converted into gardens and settlements are slowly expanding, but steep anticlines are still all covered with primary forest. The forested part of the maximum EOO is stable. Continuing decline in extent and quality of habitat is observed and projected in synclines of Bird's Neck but this trend likely will not affect anticlines. Significant decline in AOO or EOO cannot be projected for this species for next 10 years. Additional research is required on distribution, population size and trend for *P. lengguru* sp. nov. Threats for this species to be clarified. Terrestrial nature conservation area should be created in order to protect local fauna of southern Bird's Neck.

Palaina (s. l.) ***leptotoreutos* van Benthem Jutting, 1958** (Plate 39 figs 12-14, map 16)

Holotype NMNL: Papua, Misoöl, Fakal, 0-75 m, M.A. Lieftinck, 10.07.1948.

References: van Benthem Jutting (1958a: 314); van Benthem Jutting (1963: 703).

Measurements: Holotype H = 3 mm, D = 1.8 mm, HW = 1.8 mm, PD = 1.4 mm. Selected paratypes (according to the original description) H = 2.5 mm, D = 1.5 mm, PD = 1.2 mm; H = 2.8 mm, D = 1.6 mm, PD = 1.3 mm; H = 3.2 mm, D = 1.6 mm, PD = 1.5 mm.

Description: Shell is large, yellowish, sinistral, cylindrical with flattened apex. Shell with 5½ strongly convex whorls, the 1¾ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is constricted, ascending, as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by a short zone of more distant axial ribs. The constriction situated on same axis with the columellar side of the aperture. The teleoconch is sculptured with coarse dense straight ribs. The ribs becoming distinctly more widely-spaced on the ultimate whorl. There are abrupt changes in the ribbing pattern (see above). The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are about 17-18 ribs per 1 mm, but about 10-11 per 1 mm on the apertural side above the aperture. Spiral striae are very delicate and dense. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, very thick and consists of numerous dense lamellae in lateral view. The parietal margin of the peristome is attached to the ultimate whorl. The columellar margin of the inner peristome is sinuous. The inner peristome forms a very broad continuous polished callus which expands and covers about a half of the ultimate whorl in apertural view. The outer peristome is discontinued parietally. The palatal margin of the outer peristome is sinuous. No specimens were available to study the internal lamellae. Operculum is unknown.

Ecology: Unknown. Misool Island is covered by primary lowland rainforests, mostly on limestone soils.

Distribution: Raja Ampat Islands: Misool Island.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. The maximum EOO estimated below 2000 km^2 taking into account the area of Misool and available habitat. The maximum AOO estimated much higher but below 500 km^2. The population size and trend are unknown. No recent material is available on this species. Further research is required to clarify status of this species in the wild, measure the population and highlight threats.

Palaina (s. l.) ***liliputana* van Benthem Jutting, 1963** (Plate 39 figs 15-17, map 27)

Holotype NMNL: Papua, Biak, A. Hollander, Dec. 1952.

References: van Benthem Jutting (1963: 710, plate 30 fig. 32).

Measurements: Holotype H = 2.1 mm, D = 1.2





mm, HW = 1.1 mm, PD = 1 mm. Selected paratypic specimens (according to the original description): H = 2.3 mm, D = 1.2 mm, PD = 1 mm; H = 2.1 mm, D = 1.2 mm, PD = 0.8 mm.

Description: Shell is very small, creamy-coloured, sinistral, obese with conical apex. Shell with 5¼ strongly convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is constricted and slightly ascending, it is about as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by presence of a broad shallow impression and a sutural impression above the constriction. The constriction is more or less centered in apertural view. The teleoconch is sculptured with fine dense straight ribs. The ribs becoming slightly more distant on the last half whorl, but are inconspicuously denser at the constriction. There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those of the previous whorls and are oblique to the coiling axis. There are about 10 ribs per 0.5 mm. Spiral striae are very delicate. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, very thick and consists of numerous dense lamellae in lateral view. The parietal margin of the peristome is not fully attached to the ultimate whorl. The palatal margin of the inner peristome is slightly sinuous. The inner peristome forms a very broad continuous polished callus which expands and covers up to a half of the ultimate whorl. The outer peristome is as wide as the penultimate whorl in apertural view. The margins of the outer peristome are not sinuous. No specimens were available to study the internal lamellae. Operculum is unknown.

Ecology: Specimens found in soil.

Distribution: Cenderawasih Bay: Biak Island. Paratypic specimen from Onin Peninsula (Kokas env.) belongs to hitherto undescribed species which is different primarily in the parietal margin of the peristome pressed against the ultimate whorl (not pressed in *P. liliputana*), the palatal margin of the peristome being straight (it is sinuous in *P. liliputana*), less thick peristome in left lateral view and the ultimate whorl being ascending and covering less than a half of the ultimate whorl in apertural view (the ultimate whorl is slightly ascending in *P. liliputana*). Single specimen from env. Kokas is broken and no additional material is available, therefore this species is not described in this work.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. The maximum EOO for this species estimated 7800 km^2 taking into account the area of Biak, Supiori, Numfoor and adjacent islets. The maximum AOO is definitively below the threshold of 500 km^2. This species is known from specimens sampled about 70 years ago and has not been collected again. Biak is widely known by high proportion of endemic molluscs (e.g. van Benthem Jutting 1963). The population size and trend for *P. liliputana* is unknown. Threats for this species are unknown. Further research is required to uncover present status of this species in the wild, measure its population size and highlight threats.

Palaina (s. l.) ***louisiade*** **sp. nov.** (Fig. 59, plate 39 figs 18-23, map 25)

http://zoobank.org/13849282-8A0D-4015-AA93-7BD47D28A95E

Holotype UF (No 342882): UF 342882 Diplommatinidae 1 specimen(s) *Palaina* [printed] sp3 [handwritten] Papua New Guinea, Milne Bay Province Misima island, Kaubwaga Primary School at Genisia Creek stream, on limestone blocks 40 meters 10.64615° S 152.83793° E Slapcinsky, J. D. 08-April-04 JS-0703 dry FLORIDA MUSEUM OF NATURAL HISTORY [printed] / 342882 [printed] / UF 342882 [handwritten].

Paratypes 2 specimens UF: 1 subadult: same labels as holotype; 1 adult UF: 340953 Diplommatinidae 2 specimen(s) [sic! only one specimen available] *Palaina* Papua New Guinea, Milne Bay Province Misima island, Kaubwaga Primary School at Genisia Creek stream, on limestone blocks 40 meters 10.64615° S 152.83793° E Slapcinsky, J. D. 08-April-2004 JS-0703 drowned in water > 75% ethanol FLORIDA MUSEUM OF NATURAL HISTORY [printed] / Palaina 703 [handwritten].

Derivatio nominis: Toponymic. This species named after Louisiade Islands southeast of New Guinea where it occurs. Noun in apposition, invariable.

Measurements: Holotype H = 2.4 mm, D = 1.3 mm, HW = 1.4 mm, PD = 1 mm. Paratypic specimens: H = 2.45 mm, D = 1.2 mm, HW = 1.3 mm, PD = 1 mm; H = 2.2 mm, D = 1.1 mm, HW = 1.2 mm, PD = 0.8 mm [subadult specimen].

Description: Shell is small, white or creamy, sinistral, cylindrical with conical apex. Shell with 5½ convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. The protoconch is placed oblique on the rest of the shell. The ultimate whorl is constricted, narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is very poorly defined by a shallow impression and a zone






of denser placed axial ribs. The constriction is more or less centered in apertural view. The teleoconch is sculptured with delicate dense straight or slightly sinuous ribs. There are abrupt changes in the ribbing pattern - the ribs becoming much coarser and 2-2.5x more distant on tuba. The ribs are partially synchronized with those of the previous whorls and are slightly oblique to the coiling axis. There are about 12-14 ribs per 1 mm. Spiral striae are lacking. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is slightly shifted left against the coiling axis in apertural view. The peristome is double, thin in lateral view. The parietal margin of the peristome is attached to the ultimate whorl. The palatal margins of both peristomes are slightly sinuous. The inner peristome forms a continuous polished callus which is discontinued parietally. The outer peristome is broadly discontinued parietally. The columella is shiny and thin, slightly curved. The operculum is derivative, circular and transparent, with low concentric ridges and vague median impression on the outer surface.

Differential diagnosis: Most closely related with *Palaina adelpha* Soós, 1911 (Eastern New Guinea), *P. flavocylindrica* sp. nov. (Bird's Neck Isthmus of New Guinea; see description of this species above) and *P. psittricha* sp. nov. (Misool Island; see description of this species below). The operculum is simple (without concentric ridges) in *P. louisiade* sp. nov. (it is high, consists of concentric ridges in both *P. adelpha* and *P. psittricha* sp. nov.). The columella is significantly broader in *P. flavocylindrica* sp. nov. and *P. psittricha* sp. nov. than in *P. louisiade* sp. nov. The peristome is significantly narrower in lateral view in *P. louisiade* sp. nov. than in *P. psittricha* sp. nov. The axial ribs are generally less prominent in *P. louisiade* sp. nov. than in *P. adelpha*.

Ecology: Specimens collected from limestone formations near streams at low altitudes.

Distribution: Louisiade Islands: Misima Island. One badly broken specimen from Rossel Island in UF collection possibly also belongs to this species.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO. The maximum EOO estimated below 5000 km^2 taking into account the area of Louisiade Islands and available habitat. The current AOO is 4(8) km^2 (see note on Rossel Island record above). The maximum AOO is likely higher but estimated below the threshold of 500 km^2. The population size and trend are unknown. Threats for this species are unknown. Further research is required on distribution of this species, its population size and threats.

Palaina (s. l.) ***mairasi*** **sp. nov.** (Fig. 67, plate 39 figs 24-32, map 25)

http://zoobank.org/811642AE-5DEA-4AE7-9BB8-DA5657A19610

Holotype NME: INDONESIA E, West Papua, S Bird's Neck, Kaimana 47 km E, Triton bay, Kamaka (former Warika) vill. env., Lake Kamakawalar and surroundings, 3°46'22"S, 134°12'02"E, 60-310 m, 08.IX.2010, primary lowland rainforest, leg. K.Greķe.

Paratypes 224 specimens: 56 adults, 17 subadults & 55 juv. KGC, 33 adults & 20 juv. NME, 2 LKCNHM, 2 SMF: same label as holotype; 30 adults KGC, 7 adults & 2 subadults NME: INDONESIA E, West Papua, S Bird's Neck, Kaimana 40 km E, Triton bay, Lobo vill. & env., 3°45'33"S, 134°06'11"E, 15-150 m, 11-12.IX.2010, secondary & primary rainforest on limestone, leg. K.Greķe.

Derivatio nominis: Named after Mairasi, a local tribe and language of southern Bird's Neck of New Guinea. Noun in apposition, invariable.

Measurements: Holotype H = 3.7 mm, D = 2.3 mm, HW = 1.9 mm, PD = 1.8 mm. Selected paratypic specimens from type locality: H = 4.1 mm, D = 2.3 mm, HW = 2.1 mm, PD = 1.9 mm; H = 3.95 mm, D = 2.3 mm, HW = 2 mm, PD = 1.8 mm; H = 3.7 mm, D = 2.1 mm, PD = 1.9 mm; H = 3.7 mm, D = 2 mm, PD = 1.7 mm. Selected paratypic specimens from Lobo env.: H = 3.4 mm, D = 2 mm, HW = 1.75 mm, PD = 1.5 mm; H = 3 mm, D = 1.8 mm, HW = 1.5 mm, PD = 1.4 mm; H = 2.8 mm, D = 1.6 mm, PD = 0.8 mm.

Description: Shell is large, white, yellow to pale brown, dextral, obese cylindrical with conical apex. W = 6-6¼, very convex, of them 1.5 microscopically pitted embryonic whorl. The suture is rather deeply impressed. The ultimate whorl is constricted and slightly ascending, in apertural view not or slightly narrower than the penultimate whorl. The umbilicus is closed in adult. The constriction is well defined by presence of a shallow and broad impression, deeply impressed suture above the constriction and a zone of denser placed axial ribs. The constriction is more or less centered in apertural view. With an inconspicuous bulb just beyond the constriction above the columellar side of the aperture. The teleoconch is sculptured with delicate, dense, slightly sinuous ribs. The ribs becoming coarser and somewhat more widely-spaced on the last half whorl. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are 11-13 ribs per 1 mm. Spiral striae delicate, very dense. The aperture deeply impressed suture over the constriction area, circular,





rarely oval, apertural rim is entire. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, thin in lateral view. The parietal margins of the peristome are attached to the ultimate whorl. Palatal and columellar margins of both peristomes are sinuous. The inner peristome forms a continuous polished callus. The outer peristome is broadly discontinued parietally. The columella is smooth, straight and moderately broad. The operculum is derivative - in a form of a flying disc, with raised margin and concentric ridges on the outer surface.

Differential diagnosis: Most closely related *Palaina novoguineensis* E.A. Smith, 1897 (Onin Peninsula and Bird's Neck Isthmus of New Guinea), differs specifically in less conspicuous bulb (conspicuous, angulate projecting in *P. novoguineensis*), straight columella (the columella is slightly curved in *P. novoguineensis*), and in operculum with raised margin and without concentric ridges (operculum with several concentric ridges in *P. novoguineensis*).

Ecology: This species occurs in primary and secondary lowland rainforests at altitudes from sea level up to 310 m. Specimens observed in wet leaf litter and under decaying wood at base of limestone outcrops.

Distribution: New Guinea: southern part of Bird's Neck Isthmus.

Conservation status: Least Concern, LC. The current EOO is about 40 km^2, but maximum EOO for this species is estimated about 19000 km^2 taking into account the area of Bird's Neck Isthmus of New Guinea and available habitat. The current AOO is 20 km^2, the maximum AOO estimated between 500-2000 km^2 considering available habitat and biogeographical peculiarities. Population size and trend are unknown, but this species is very abundant at certain localities. Loss and altering of habitat are the main threats. There are two locations for this species. On southern Bird's Neck, coastal areas being converted into gardens or expanding settlements but steep anticlines are still all covered by primary forest. The forested part of the maximum EOO is quite stable. Continuing decline in extent and quality of habitat is observed and estimated in lowland areas and synclines of Bird's Neck and this trend likely will not affect anticlines. I can't project significant decline of habitat for the next 10 years. Additional research is required on distribution, population size and trend, as well as on threats for this species. Terrestrial nature conservation area should be established in order to protect local fauna of southern Bird's Neck.

Palaina (s. l.) ***manggaraica*** **(B. Rensch, 1931) comb. nov.** (Figs 68-69, plate 40 figs 1-9, map 13)

Holotype MHUB: Sunda-Expedition Rensch Fundort: [printed] Ranan Mere [sic!] (12-1300m) W. Flores [handwritten] Datum: [printed] 19.-29.6.27 [handwritten] No: [printed] / Zoolog. Museum Berlin [printed] Arinia manggaraica * Rensch Rana Mere, W. Flores 12-1300m 19.-29 6.27 75448 Rensch leg [handwritten] / Zoolog. Museum Berlin. Typus von: [printed] Arinia manggaraica Rensch Zool. Jahrb. Syst., 61, p. 391, Fig. 16, 1931 [handwritten] [label red].

Additional material: 1 adult KGC & 1 adult NME: INDONESIA, Nusa Tenggara, Flores Is., Gn. Ranaka mt., 08°37.386'S, 120°31.156'E, 1575 m, 10.III.2011, primary lower montane rainforest, soil sample No 11, leg. A.Riedel; 1 adult KGC: INDONESIA, Nusa Tenggara, Flores Is., Gn. Ranaka mt., 08°37.714'S, 120°31.509'E, 1850 m, 10.III.2011, primary mid montane rainforest, soil sample No 7, leg. A.Riedel; 1 adult KGC: INDONESIA, Nusa Tenggara, Flores Is., Gn. Ranaka mt., 08°37.641'S, 120°31.204'E, 1685 m, 10.III.2011, primary lower montane rainforest, soil sample No 9, leg. A.Riedel; 1 adult KGC: INDONESIA, Nusa Tenggara, Flores Is., Golo Lusang, 08°39.875'S, 120°27.596'E, 1565 m, 11.III.2011, primary lower montane rainforest, soil sample No 2, leg. A.Riedel.

New combination: This new combination is based on the results of COI analysis since this species represents same clade with another *Palaina* (see below).

References: Rensch B. (1931: 391), as *Arinia manggaraica*.

Measurements: Holotype H = 2.3 mm, D = 1.25 mm, HW = 1.9 mm, PD = 0.9 mm. Specimens from Mt. Ranaka: H = 3 mm, D = 1.55 mm, PD = 1.3 mm; H = 2.15 mm, D = 1.1 mm, PD = 0.8 mm; H = 2.05 mm, D = 1.2 mm, PD = 0.9 mm. Specimen from Golo Lusang H = 2.05 x 1.1 mm, aperture 0.85 mm.

Description: Shell is small, yellowish, whitish or pale brown, dextral, cylindrical with flattened apex. Shell with 5¼-5½ convex whorls, the 1¼ embryonic whorl is smooth (no microscopic sculpture visible at 300x magnification). The suture is deeply impressed. The ultimate whorl is slightly constricted, it is about as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is not delimited on shell wall. The teleoconch is sculptured with delicate dense straight axial ribs. The ribs are most dense on the penultimate whorl and becoming coarse and very widely-spaced on the last half whorl. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. Spiral striae are lacking at 80x






magnification. The aperture is not or barely tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, thick and consists of a few strong lamellae in lateral view. The parietal margin of the peristome is attached to the ultimate whorl. The margins of the inner peristome are not sinuous. The inner peristome forms a continuous polished callus. The outer peristome is broadly discontinued parietally, its palatal margin is slightly sinuous. The columella is glass-like semitransparent, provided with a lateral callus all along its length; this callus is directed backwards. The operculum is derivative - circular, in a form of a flying disc with slightly raised margin and bears concentric lines.

Phylogeny: According to results of COI analysis this species represents a separate clade of *Palaina* species from Lesser Sunda Islands (*P. manggaraica*) and Lease Islands (*P. angulata* O. Boettger, 1891 & *P. ascendens* (Martens, 1867). Proposed new combination is based on the phylogenetic reconstruction.

Ecology: This species inhabits primary lower montane rainforests, where it can be found in leaf litter. Known from altitudes of 1575-1850 m.

Distribution: Lesser Sunda Islands: Flores Island.

Conservation status: Endangered, EN B2ab(ii,iii). The current EOO is about 55 km^2. The maximum EOO estimated about 15000 km^2 taking into account the area of Flores Island (13540 km^2) and adjacent islands. The current AOO is 12 km^2 but the real AOO estimated 500 km^2. This species is underresearched. The population size and trend are unknown, *P. manggaraica* is not abundant. This species avoids arid and deforested lowlands. Three localities are currently known for this species. The population is not severely fragmented, but the grade of fragmentation is likely to increase. The main threats for this species are habitat alteration and destruction due conversion of the rainforest into gardens, timber collecting and small-scale logging. It results in habitat alteration, fragmentation and decline in the AOO. Growing human population of Flores combined with more frequent and longer dry periods caused by global warming and El Niño weather patterns will likely have negative effect on the remaining natural rainforests of Flores. Between 2001 and 2014, Flores, its adjacent islands of Lembata, Adonara, Solor and Rinca lost almost 29000 ha of lowland forest (calculated for canopy density over 25% according to the Global Forest Watch (2016)). Human population is not spreading from lowlands to the montane areas, but wet mountains are threatened by expanding small-scale gardens and logging for construction purposes. This trend is likely to cause a continuing decline in the AOO and extent of the habitat. There are two locations for *Palaina manggaraica*. The human population is not encroaching on the habitat too dramatically yet, but a continuing decline in the near future is projected. Additional research is required on the distribution, population size and threats for *P. manggaraica*.

Palaina (s. l.) ***megalostoma* sp. nov.** (Fig. 70, plate 40 figs 10-13, map 21)

http://zoobank.org/B30CA578-4FD5-4594-86B8-54E2EF7DC507

Holotype NME: INDONESIA E, Raja Ampat, Waigeo Island, Waisai 10 km NWW, 00°24'46"S, 130°44'11"E, 70-200 m, 19.II.2012, primary lowland rainforest on limestone, leg. D.Telnov.

Paratypes 3 specimens: 1 subadult NME, 2 adults & 1 subadult KGC: same label as holotype.

Derivatio nominis: Named from Greek "μεγάλος" [big] and "στόμα" [mouth], because of very large aperture in this species.

Measurements: Holotype H = 4.1 mm, D = 2.7 mm, HW = 2.35 mm, PD = 2.3 mm. Selected paratypic specimens: H = 4.25 mm, D = 3 mm, HW = 2 mm, PD = 2 mm; H = 4.1 mm, D = 3 mm, HW = 2.25 mm, PD = 2.1 mm.

Description: Shell is large whitish to pale brown, sinistral, obese with flattened apex. Shell with 6¼ convex whorls, the 1½-1¾ embryonic whorl is microscopically pitted. The suture is rather deeply impressed. The ultimate whorl is constricted, ascending and narrower than the penultimate whorl in apertural view. The umbilicus is narrowly open and perspective. The constriction not delimited on shell wall in fully grown specimens, because most of the ultimate whorl is covered by expanded peristome in apertural view. In subadult specimens the constriction is well defined by denser placed and less coarse axial ribs, presence of a flat impression and suture with a cavity-like impression above the constriction. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse dense sinuous axial ribs. The ribs of 3-4 whorls becoming higher (somewhat lamella-like) in their lower parts. The ribs becoming inconspicuously sparser on the last half whorl. There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those of the previous whorls and are oblique to the coiling axis. There are 11-12 ribs per 1 mm. Spiral striae are lacking. The







aperture is not tilted against the coiling axis, is oval and has entire apertural. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is simple. Numerous very dense lamellae present at the very end of the ultimate whorl prior to the peristome. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a very broad continuous polished callus, strongly expands in fully grown specimens and covers most of the ultimate whorl in apertural view. The palatal margin of the peristome is slightly sinuous. The columella is very broad and smooth with a large triangular median knob which is directed backwards. The operculum is derivative - circular, with concentric ridges on the outer surface.

Differential diagnosis: A very distinctive species among all congeners due to the combination of the following characters: shell obese, umbilicus open and perspective, the inner peristome very strongly expands and covers most of the ultimate whorl in apertural view.

Phylogeny: According to results of COI analysis this species represents a separate clade together with another Waigeo species *P. hartmanni* sp. nov.

Ecology: Specimens were sampled from underside of large fallen leaves in primary lowland rainforest on limestone soil in a flat low area which overflows during heavy rains.

Distribution: Raja Ampat Islands: Waigeo Island

Conservation status: Near Threatened, NT. This species inhabits western peninsula of Waigeo Island and is hitherto recorded from single locality. Not enough data available to calculate current EOO. The maximum EOO estimated under 5000 km^2 taking into account the area of Waigeo and adjacent islets. The current AOO is 4 km^2, but the maximum AOO estimated below 500 km^2 taking into account available habitat. The population size is unknown, but the species is uncommon compared to another Waigeo diplommatinids. Habitat loss is the main threat. Growing human population of western Waigeo and increasing tourism in this area (both national and international) demand more gardens, infrastructure and tourism resorts. Waigeo got a regency capital of Raja Ampat administrative province of Indonesia some years ago which resulted in boosting development, investments into Waisai, the new regency capital and in provincial airport. Waigeo is initially rich in limestone rocks and limestone is widely used for roads and buildings construction. Growing population (partly a result of immigration from other islands of Indonesia) requires more firewood and charcoal. An illegal logging is rare but is a reality. Aforementioned factors result in decline of primary lowland rainforests especially in south-western part of Waigeo and this trend is observed, projected and likely to continue. No direct effect of aforementioned threats was observed on the population of *P. megalostoma* sp. nov. On the other hand, *P. megalostoma* sp. nov. was not found in disturbed forests. Between 2001-2014 south-western Waigeo lost just about 1100 ha of the rainforest (calculated for canopy density over 25% according to the Global Forest Watch (2016)), but not exactly in the area where *P. megalostoma* sp. nov. occurs. Additional research is required on Waigeo to clarify distribution of this species, calculate population size and highlight threats.

Palaina (s. l.) ***mengen* sp. nov.** (Fig. 71, plate 40 figs 17-23, map 29)

http://zoobank.org/A17B5493-F4C9-4B22-A804-FBE1B6C3A959

Holotype UF (No 508074): UF 366601 Mollusca, Diplommatinidae 15 specimen(s) *Palaina* [printed] sp. 9 [handwritten] Papua New Guinea, East New Britain Province New Britain, 12 km N Marmar Village along trail to Pakia Village secondary hill forest 900 meters 5.43187° S 151.45971° E Slapcinsky, J. 25-February-2005 JS-0772 dry FLORIDA MUSEUM OF NATURAL HISTORY [printed] / 772 [handwritten] / Mollusca 366601 [printed].

Paratypes 18 specimens: 9 adults, 2 subadults & 2 juv. UF, 1 adult KGC: same labels as holotype [two adults are badly broken]; 4 adults UF: UF 366603 Mollusca Diplommatinidae 4 specimen(s) *Palaina* Papua New Guinea, East New Britain Province New Britain, Saukale, 13 km NW Marmar Village along trail to Pakia Village primary hill forest 850 meters 5.42551° S 151.45337° E Slapcinsky, J. 2/28/2005 JS-0775 drowned in water > 75% ethanol FLORIDA MUSEUM OF NATURAL HISTORY [printed] / 775 [handwritten] [one adult is badly broken].

Derivatio nominis: This species is named after Mengen, local tribe and language of New Britain, where this species was first found. Noun in apposition, invariable.

Measurements: Holotype H = 2.4 mm, D = 1.5 mm, HW = 1.45 mm, PD = 1.2 mm. Selected paratypic specimens: H = 2.5 mm, D = 1.5 mm, HW = 1.3 mm, PD = 1.1 mm; H = 2.45 mm, D = 1.4 mm, HW = 1.4 mm, PD = 1.2 mm; H = 2.4 mm, D = 1.5 mm, HW = 1.35 mm, PD = 1.2 mm; H = 2.4 mm, D = 0.95 mm, HW = 1.4 mm, PD = 1.05 mm.

Description: Shell is small, yellowish, sinistral, broadly conical with conical apex. Shell with 5¼ convex whorls, the 1½ embryonic whorl is microscopically pitted (pits are partly arranged in axial rows). The suture is moderately deeply impressed.






The ultimate whorl is constricted, as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well defined by a short shallow impression, a short zone of denser and stronger sinuous axial ribs and deeply impressed suture above the constriction. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse dense, partly straight partly sinuous ribs. The ribs becoming coarser (higher) and more widely-spaced on the last half whorl. There are no abrupt changes in the ribbing pattern except at the area of constriction (see above). The ribs are not synchronized with those of the previous whorls and are slightly oblique to the coiling axis. There are 10-12 ribs per 1 mm. Spiral striae are very delicate and dense. The aperture is not tilted against the coiling axis, is circular or oval and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The parietal side of the peristome is attached to the ultimate whorl. The peristome is double, thin in lateral view. The inner peristome forms a continuous polished callus. The palatal margins of both peristomes are sinuous. The inner peristome with two obtuse protrudings - near the parietal / palatal and the columellar / parietal junctions. The columella is broad and smooth with glass-like semitransparent callus all along its inner margin. The operculum is derivative - circular or ovoid, transparent, with slightly indicated concentric lines and broad, short and flat spatula-like median "handler" on the inner surface.

Differential diagnosis: This species is conchologically similar to *Palaina commixta* I. Rensch, 1937 (New Britain Island), but differs in lower and broader shell, presence of a median knob along inner margin of the columella (the columella is twisted in basal fourth in *P. commixta*), the axial ribs not being bent counter-clockwise (see description of *P. commixta* above for further details), and the inner peristome provided with two protrudings (protrudings are absent in *P. commixta*).

Ecology: Primary and secondary lower montane rainforests, sampled at altitudes 850-900 m.

Distribution: Bismarck Archipelago: New Britain Island.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO. The current AOO is 8 km^2, but the maximum AOO is likely much higher. The population size and trend are unknown. Since this species also reported from secondary rainforests, threats for this species cannot be identified without additional basic studies.

Palaina (s. l.) ***minuscularia*** **sp. nov.** (Figs 72, 127-128, plate 41 figs 1-9, map 16)

http://zoobank.org/640EC68D-FA1F-433F-A70B-F4BDCF0DCE6B

Holotype NME: INDONESIA E, Raja Ampat, Misool Island (central), River Gam upstream, Gamta vill. 12-14 km NW, 01°57'50"S, 130°11'09"E, 350 m, 06.II.2012, primary lowland rainforest on limestone, leg. D.Telnov.

Paratypes 8 specimens: 3 adults KGC & 1 adult NME: same label as holotype; 1 adult KGC & 1 adult NME: INDONESIA E, Raja Ampat, Misool Island (central), River Gam upstream, Gamta vill. 12-14 km NW, 01°57'50"S, 130°11'09"E, 70-350 m, 04-06.II.2012, primary lowland rainforest on limestone, leg. D.Telnov; 33 adults KGC & 10 adults NME: INDONESIA E, Raja Ampat, Misool Island S, Lilinta (Lelintah) vill. env., 02°02'57,43"S, 130°15'58,11"E, 16 m, 02.II.2012, secondary lowland rainforest on limestone, leg. D.Telnov.

Derivatio nominis: This species is named from Latin 'minuscularius' [small, smallest], because of the extraordinary small shell.

Measurements: Holotype H = 1.3 mm, D = 0.7 mm, HW = 0.7 mm, PD = 0.55 mm. Selected paratypic specimens from locus typicus: H = 1.4 mm, D = 0.8 mm, HW = 0.8 mm, PD = 0.55 mm; H = 1.35 mm, D = 0.75 mm, HW = 0.8 mm, PD = 0.5 mm. Selected paratypic specimens from Lilinta vill. env.: H = 1.8 mm, D = 0.9 mm, HW = 0.8 mm, PD = 0.6 mm; H = 1.7 mm, D = 1 mm, HW = 0.8 mm, PD = 0.7 mm; H = 1.6 mm, D = 0.9 mm, HW = 0.9 mm, PD = 0.7 mm.

Description: Shell is very small, white, sinistral, cylindrical with flattened apex. Shell with 5¼ convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is rather deeply impressed. The ultimate whorl is slightly constricted, nearly as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by weak sutural impression above it. The constriction situated on same axis with the columellar side of the aperture. The teleoconch is sculptured with delicate and dense straight or slightly sinuous axial ribs. The ribs becoming coarser and more distant on the last half whorl. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are slightly oblique to the coiling axis. There are about 25-28 ribs per 0.5 mm. Spiral striae are distinct, very delicate and rather widely-spaced (4 rows of spiral striae per 30 µm measured on the ultimate whorl above the aperture). The aperture is not or slightly tilted against the coiling axis, is circular and has entire apertural rim. The aperture is more or less centered below the penul-









timate whorl in apertural view. The peristome is distinctly double. There are 2 strong lamellae between the inner and the outer peristomes in fully grown specimens. The parietal margin of the peristome is attached to the ultimate whorl. Peristomal margins are not sinuous. The inner peristome forms a continuous polished callus. The outer peristome is broadly discontinued parietally. The columella is thin and glass-like semitransparent, provided with a small basal knob. The operculum is derivative - circular, in a form of a flying disc with slightly raised margin and without ridges.

Differential diagnosis: This species is similar to several minute Papuan *Palaina*. Specific characters are discussed in table 15.

Ecology: This species occurs in primary and old-growth secondary lowland rainforests. Specimens observed in wet leaf litter accumulated in cavities at limestone formations as well as on the undersides of fallen leaves.

Distribution: Raja Ampat Islands: Misool Island.

Conservation status: Least Concern, LC. The current EOO is about 12 km^2. The maximum EOO estimated less than 2000 km^2 taking into account the area of Misool Island and available habitat. The current AOO is 8 km^2. The maximum AOO estimated much higher but definitively below 500 km^2. The population size and trend are unknown. Generally, *Palaina minuscularia* sp. nov. is not uncommon. This species is currently known from two localities and inhabits both primary and old-growth secondary lowland rainforests on limestone soils. No major threats to this species have been identified. Misool Island is still very pristine and covered by primary rainforests for over 75%. Further research is required on distribution of this species as well as on population size and threats.

Table 15. Papuan species of *Palaina* s. l. similar to *P. minuscularia* sp. nov. and their distinctive characters.

Species	**Character**	**Character in *P. minuscularia* sp. nov.**
Palaina flavocylindrica sp. nov.	spiral striae are lacking at 80x magnification (but is very delicate and dense at 300x magnification), the columella simple, several lamellae between the inner and the outer peristomes	spiral striae are distinct at 80x magnification, the columella with basal knob, 2 rather strong lamellae between the inner and the outer peristomes
P. iha sp. nov.	axial ribs are rather high and coarse, about 14-16 ribs per 0.5 mm, columella simple, 8-9 rows of spiral striae per 30 µm (measured above the aperture), few inconspicuous flat lamellae between the inner and the outer peristomes, the outer peristome is stronger than the inner one	axial ribs are delicate and rather low, about 25-28 ribs per 0.5 mm, columella with knob, 4 rows of spiral striae per 30 µm (measured above the aperture), 2 rather strong lamellae between the inner and the outer peristomes, the outer peristome is not conspicuously stronger than the inner one
P. insulana sp. nov.	the columella is simple, H = 1.8-1.95 mm, 7-8 rows of spiral striae per 30 µm (measured above the aperture), with several lamellae between the inner and the outer peristomes	the columella with basal knob, H = 1.3-1.6 mm, 4 rows of spiral striae per 30 µm (measured above the aperture), 2 rather strong lamellae between the inner and the outer peristomes
P. waigeo sp. nov.	the columella is simple, 5-6 rows of spiral striae per 30 µm (measured above the aperture), few inconspicuous flat lamellae between the inner and the outer peristomes, the outer peristome is stronger than the inner one	the columella with basal knob, 4 rows of spiral striae per 30 µm (measured above the aperture), 2 rather strong lamellae between the inner and the outer peristomes, the outer peristome is not conspicuously stronger than the inner one

Palaina (s. l.) ***minutula*** **sp. nov.** (Plate 40 figs 24-26, map 6)

http://zoobank.org/699275D3-1F89-4D1D-8091-EB5D8D61EB96

Holotype NME: INDONESIA E, North Moluccas, Halmahera N, Galela area, Mt. Ngededo Ma Girapang at Roko vill., 1°50'07"N, 127°43'17"E, 230 m, 02.VII.2013, primary & secondary lowland rainforest, leaf litter, leg. K.Greķe.

Derivatio nominis: Named from Latin "minutulus" [tiny, very small], because of minute size of the shell.

Measurements: Holotype H = 1.35 mm, D = 0.85 mm, HW = 0.8 mm, PD = 0.6 mm.

Description: Shell is very small, creamy to pale brown, dextral, cylindrical with flattened apex. Shell with 5 convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is deeply im-






pressed. The ultimate whorl is slightly constricted, slightly wider than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is not delimited on shell wall. The teleoconch is sculptured with coarse widely-spaced straight axial ribs. The ribs becoming 4x more distant on the last half whorl. The ribs are straight to the coiling axis. There are 9-10 ribs per 0.5 mm. Spiral striae are lacking. The aperture is not tilted against the coiling axis, is circular and has entire apertural rim. The aperture is shifted right against the coiling axis in apertural view. The peristome is distinctly double, without lamellae between the inner and the outer peristome. The parietal margin of the peristome is attached to the ultimate whorl. The outer peristome is broadly discontinued parietally. The inner peristome forms a continuous polished callus. Peristomal margins are not sinuous. Because only one specimen was available for study, I did not damage the shell to observe the internal lamellae which remains unknown for this species. Operculum is unknown.

Differential diagnosis: Very distinctive species among all congeners due to the combination of the following characters: shell very small, axial ribbing pattern very widely-spaced, the peristome strong and distinctly double.

Ecology: The only known specimen was sampled from leaf litter in primary lowland rainforest on a limestone hill where small-scale selective logging was ongoing. This locality is now selectively logged.

Distribution: North Moluccas: Northern arm of Halmahera Island.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO. The maximum EOO estimated under 20000 km^2 taking into account its possible distribution on Halmahera as well as on Bacan. The maximum EOO is estimated about 5000 km^2. The current AOO is 4 km^2, the maximum AOO is possibly significantly larger but estimated less than 500 km^2. The population size and trend are unknown. Habitat loss and alteration caused by logging, mining, and conversion of forests into gardens and plantations, as well as expansion of human settlements in lowland areas are main threats. However, the impact on *P. minutula* sp. nov. population is not yet documented. The forested part of the maximum EOO is decreasing constantly, between 2001 and 2014 over 87000 ha of the rainforest were lost (calculated for canopy density over 25% according to the Global Forest Watch (2016)). Continuing decline in extent and quality of habitat is observed and projected, especially considering constantly growing human population of North Moluccas. Further basic research on population size, trend, ecological preferences and threats for *P. minutula* sp. nov. is essential.

Palaina (s. l.) ***mirifica* sp. nov.** (Figs 73-74, plate 41 figs 10-22, map 15)

http://zoobank.org/9601DA83-E9FB-483E-8CA0-0B46ECF394D9

Holotype NMNL: Coll. J.J. Vermeulen, nr. 4728 Palaina indet. - Diplommatinidae 1995.06. INDONESIA. Tanimbar Islands; W part Yamdena Isl., near Kpg. Makatian. Undisturbed primary forest on limestone, near riverbed, 4-6 km from the sea (3-5 km from a brackish river). Leg. A.J. Whitten, 00/10/1995.

Paratypes: 16 adults NMNL: 9 same label as holotype; 7 adults NMNL: Coll. J.J. Vermeulen, nr. 4727 Palaina indet. - Diplommatinidae 1995.06. INDONESIA. Tanimbar Islands; W part Yamdena Isl., near Kpg. Makatian. Undisturbed primary forest on limestone, near riverbed, 4-6 km from the sea (3-5 km from a brackish river). Leg. A.J. Whitten, 00/10/1995 [one adult is broken]; 2 adults LKCNHM: ZRC.1999.2451 [handwritten] / Coll. J.J. Vermeulen, nr. 4728 Arinia - [printed] ZRC.199.2451 [handwritten] Diplommatinidae [printed] 2nos [handwritten] INDONESIA, Tanimbar Group, W part Yamdena Isl., nr Kpg Makatian. Undisturbed primary fst on limestone, nr riverbed, 100-150 m asl, 4-6 km from the sea (3-5 km from a brackish river. Leg. A.J. Whitten, 10/1995. [printed] / ZOOLOGICAL REFERENCE COLLECTION DEPARTMENT OF ZOOLOGY NATIONAL UNIVERSITY OF SINGAPORE [printed] Diplommatinidae ZRC.MOL.10459 Ex [handwritten] ZRC. [printed] 199.2451 [handwritten] No. Spec. [printed] 2 nos. [handwritten] Species. [printed] Arinia [handwritten] Locality [printed] Indonesia, Tanimbar Group, W. part Yamdena Island, nr. Kampong Makatian. [handwritten] Collector [printed] A.J. Whitten Date [printed] Oct. 1995 [handwritten] Det. by [printed] JJ Vermeulen, nr. 4728 [handwritten] Date [printed]; 2 adults LKCNHM: LKCNHM: ZRC.1999.2450 [handwritten] / Coll. J.J. Vermeulen, nr. 4727 Arinia - [printed] ZRC.199.2449 [handwritten] Diplommatinidae [printed] 2nos [handwritten] INDONESIA, Tanimbar Group, W part Yamdena Isl., nr Kpg Makatian. Undisturbed primary fst on limestone, nr riverbed, 100-150 m asl, 4-6 km from the sea (3-5 km from a brackish river. Leg. A.J. Whitten, 10/1995. [printed] / ZOOLOGICAL REFERENCE COLLECTION DEPARTMENT OF ZOOLOGY NATIONAL UNIVERSITY OF SINGAPORE [printed] Diplommatinidae ZRC.MOL.10458 Ex [handwritten] ZRC. [printed] 199.2450 [handwritten] No. Spec. [printed] 2 nos. [handwritten] Species. [printed] Arinia [handwritten] Locality [printed] Indonesia, Tanimbar Group, W. part Yamdena Island, nr. Kampong Makatian. [handwritten] Collector [printed] A.J. Whitten Date [printed] Oct. 1995 [handwritten] Det. by [printed] JJ Vermeulen, nr. 4727 [handwritten] Date [printed].

Derivatio nominis: This species is named from





Latin 'mirificus' [extraordinary, wonder, marvellous], because of extraordinary expanded margins of the outer peristome.

Measurements: Holotype H = 2.8 mm, D = 2 mm, HW = 1.7 mm, PD = 1.85 mm (1 mm without expanding margin of the outer peristome). Selected paratypic specimens: H = 3.3 mm, D = 2.5 mm, HW = 1.9 mm, PD = 2.15 mm (1.2 mm without expanding margin of the outer peristome); H = 3.05 mm, D = 2.3 mm, HW = 1.8 mm, PD = 1.9 mm (1.2 mm without expanding margin of the outer peristome); H = 3 mm, D = 2.3 mm, HW = 1.7 mm, PD = 1.8 mm (1.1 mm without expanding margin of the outer peristome).

Description: Shell is large, whitish to creamy coloured, sinistral, obese, with conical apex. Shell with 5½ convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is moderately deeply impressed. The ultimate whorl is slightly constricted, ascending, it is slightly narrower than or as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly delimited by presence of a broad and very shallow impression and a zone of dense delicate axial ribs. A cavity-like impression present on the suture just above the constriction. The constriction situated on same axis with the columellar side of the aperture. The teleoconch is sculptured with delicate very widely-spaced and quite high straight ribs. There are abrupt changes in the ribbing pattern - early whorls and the constriction area are covered by much denser axial ribs. The ribs are partially synchronized with those of the previous whorls and are oblique to the coiling axis. There are about 4-6 ribs per 1 mm. The ribs becoming more widely-spaced on the last half whorl. Spiral striae are lacking. The aperture is not tilted against the coiling axis, is circular or oval and has entire apertural rim. In apertural view the position of the aperture is more or less central below the coiling axis or aperture shifted left. The peristome is double. The parietal margin of the peristome completely attached to the ultimate whorl. The inner peristome forms a narrow continuous polished callus. The outer peristome is more or less broadly discontinued parietally. The outer peristome expands very strongly, wing-like on the palatal, basal and columellar margins beyond the inner peristome. In several specimens this expansion overrunning over the entire penultimate whorl in apertural view (Plate 141 figs 10-14, 15 & 19) and is straight or reflexed. The palatal and the columellar margins of the outer peristome are sinuous. The columella is simple, obliquely twisted and provided with an obtuse horizontal columellaris in its basal third. The operculum is derivative - circular, with several layers of concentric ridges on the outer surface.

Differential diagnosis: This species is peculiar among all congeners primarily due to the extremely widely-spaced axial ribs and very strong expansion of the outer peristome. It differs from its sympatric congener *Palaina tanimbarensis* sp. nov. (see description of this species below) in axial ribs being straight low and not folded (ribs are folded and lamella-like high in *P. tanimbarensis* sp. nov.), more obese shell (shell is cylindrical in *P. tanimbarensis* sp. nov.) and much stronger expanding outer peristome.

Ecology: Specimens found in primary riverine lowland rainforest on limestone soil.

Distribution: Tanimbar Islands: Yamdena Island.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO. The maximum EOO estimated about 9900 km^2 taking into account the area of Tanimbar Islands. It is very unlikely *Palaina mirifica* sp. nov. is distributed all over Tanimbar Islands. The current AOO is 4 km^2, the maximum AOO estimated much less than 500 km^2 taking into account available habitat. This species is known from single locality. The population size, trend and threats are unknown. Few untouched rainforest patches remains on Yamdena Island nowadays.

Palaina (s. l.) ***misoolensis*** **sp. nov.** (Figs 75-76, plate 41 figs 23-30, map 17)

http://zoobank.org/DA95F581-452C-4300-91E9-40C0C26E4898

Holotype NME: INDONESIA E, Raja Ampat, Misool Island S, Biga vill. ~7,5 km W, River Biga valley, 02°01'23"S, 130°12'38"E, 45-78 m, 03.II.2012, primary lowland rainforest on limestone, leg. D.Telnov.

Paratypes 17 specimens: 5 adults & 2 juv. NME, 10 adults KGC: same label as holotype.

Derivatio nominis: Toponymic. This species is named after Misool Island, its area of origin.

Measurements: Holotype H = 3.2 mm, D = 2.05 mm, HW = 1.75 mm, PD = 1.6 mm. Selected paratypic specimens: H = 3.2 mm, D = 2.1 mm, HW = 1.7 mm, PD = 1.5 mm; H = 3.2 mm, D = 1.95 mm, HW = 1.8 mm, PD = 1.55 mm.

Description: Shell is large, pale yellow, yellow or pink, sinistral, broadly fusiform with conical apex. Shell with 6 rather convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is moderately deeply impressed. The penultimate whorl is somewhat bulbous. The ultimate whorl strongly con-






stricted, is narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by presence of a short and shallow impression and a cavity-like impressed suture just above the constriction. The constriction situated on same axis with the columellar side of the aperture. The teleoconch is sculptured with moderately coarse, dense, straight ribs. The ribs becoming coarser and more widely-spaced on the last half whorl. There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those of the previous whorls and are oblique to the coiling axis. There are 11-12 ribs per 1 mm. Spiral striae are very delicate and dense. The aperture is not tilted to the coiling axis and is circular to semicircular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The parietal side of the peristome is pressed against the parietal wall and is completely attached to the ultimate whorl. The peristome is double. The inner peristome forms a continuous polished callus. The margins of the inner peristome are not sinuous. The outer peristome is broadly discontinued parietally, expands strongly beyond the inner one. All margins of the outer peristome are sinuous. Four small obtuse protrudings - two basal, one palatal and one columellar - present on the outer peristome (Plate 41 figs 23, 25-26). The columella is smooth, provided with a median knob which is directed forwards. Therefore an inconspicuous flat columellaris is visible in the aperture in lateral view. The operculum is derivative - circular, with Γ-like median protruding ("handler") on the inner surface, without concentric lines.

Differential diagnosis: This species is conchologically very similar to *P. bicornis* van Benthem Jutting, 1958a and *P. quadricornis* van Benthem Jutting, 1958a (both from Misool Island) but has columellar denticle visible in the aperture (in lateral view). Another very similar species, *P. onin* sp. nov. (Onin Peninsula; see description of this species below) has simple columella.

Ecology: Specimens were sampled from the undersides of fallen leaves in primary lowland rainforest at base of limestone rocks in a wet and shady place.

Distribution: Raja Ampat Islands: Misool Island.

Conservation status: Least Concern, LC. Not enough data available to calculate current EOO. The maximum EOO estimated below 2000 km^2 taking into account the area of Misool and available habitat. The current AOO is 4 km^2. The maximum AOO estimated much higher but below 500 km^2. The population size and trend are unknown. *Palaina misoolensis* sp. nov. is locally common in riverine forests in upper course of Biga river. This species is currently known from single locality and inhabits old-growth lowland rainforests on limestone and clayish soils. No major threats to this species have been identified. Misool Island is still very pristine and covered by primary rainforests for over 75%. Further research is required on distribution of this species as well as on population size, trend and threats.

Palaina (s. l.) ***mutis* sp. nov.** (Fig. 77, plate 41 figs 31-34, map 14)

http://zoobank.org/B5DDAC20-4DBD-48CF-B700-B3F40E1AA8EA

Holotype NME: INDONESIA E, Timor W, Fatumnasi vill. 3 km NNE, 9°37'28"S, 124°14'19"E, 1620-1630 m, 05.IV.2016, base of limestone outcrop, leaf litter, leg. L.Wagner.

Paratypes 91 specimens: 15 adults & 6 juv. NME, 48 adults, 5 subadults & 17 juv. KGC: same label as holotype; 1 adult KGC: INDONESIA, Timor Island, Fatumnasi env., semidry forest, 30.III.2012, leg. L.Wagner.

Derivatio nominis: Toponymic. This species is named after Mount Mutis, the highest peak of East Nusa Tenggara (about 2427 m) where this species occurs. Noun in apposition, invariable.

Measurements: Holotype H = 4.1 mm, D = 2.25 mm, HW = 2.3 mm, PD = 1.6 mm. Selected paratypic specimens: H = 4 mm, D = 2.2 mm, HW = 2.2 mm, PD = 1.5 mm; H = 4 mm, D = 2 mm, HW = 2.1 mm, PD = 1.3 m; H = 3.9 mm, D = 2.15 mm, HW = 2.1 mm, PD = 1.4 mm; H = 3.9 mm, D = 2.2 mm, HW = 2 mm, PD = 1.4 mm; H = 3.7 mm, D = 2.1 mm, HW = 2 mm, PD = 1.3 mm.

Description: Shell is large, yellow to pale brown but white in juvenile and subadult specimens, sinistral, high cylindrical with conical apex. Shell with 6¼ convex whorls, the 1½ embryonic whorl is microscopically striate and pitted. The suture is deeply impressed. The ultimate whorl is slightly constricted and slightly descending, it is about as wide as the penultimate whorl in apertural view. The umbilicus is open, narrow and perspective. The constriction is poorly defined by a short shallow impression supplemented with a zone of somewhat denser axial ribs. A weak bulb present just beyond the constriction above the columellar side of the aperture. There is a flat cavity-like impression on the suture just above the constriction. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse dense slightly sinuous axial ribs. The ribs becoming coarser but not much sparser on the last half whorl. There are









no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are 12-15 ribs per 1 mm. Spiral striae are lacking. The aperture is not tilted to the coiling axis, is oval and has entire apertural rim. The aperture is shifted left against the coiling axis in apertural view. The peristome is double. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a broad continuous polished callus. The outer peristome is narrowly discontinued parietally. The palatal margins of both peristomes are slightly sinuous. The columella is smooth, broad. The operculum is derivative, circular with concentric ridges on outer side.

Differential diagnosis: This species is very distinctive among all congeners due to the combination of the following characters: shell high cylindrical, the ultimate whorl descending and building open and perspective umbilicus.

Ecology: Specimens were sampled from thick layer of leaf litter and decaying wood accumulated at base of limestone rock outcrops in moist lower montane eucalypt forest.

Distribution: Lesser Sunda Islands: western part of Timor Island.

Conservation status: Near Threatened, NT. Not enough data available to calculate current EOO. The maximum EOO for this species is definitively less than 5500 km^2 taking into account available habitat in western part of Timor. The maximum EOO estimated below 5500 km^2. The current AOO is 12 km^2, the maximum AOO is significantly larger but estimated below 500 km^2. The population size and trend are unknown. This species is common on Mt. Mutis on certain places with limestone outcrops. Mt. Mutis is protected area with rangers and logging is not a real threat for this area. However, grazing (cows and horses) is ongoing at lower altitudes in eucalypt forest where *P. mutis* sp. nov. occurs. Livestock is not climbing the limestone outcrops. Relic patches of rainforest in this generally arid region can also get affected by more frequent and longer dry periods caused by global warming and El Niño weather patterns. Continuing decline in extent and quality of habitat is therefore projected for the future but with a little effect within next 10 years. Presently, one location is known for this species. Further basic research is required.

Palaina (s. l.) ***novoguineensis*** **E.A. Smith, 1897**
(Fig. 64, plate 42 figs 1-13, map 26)

Lectotype BMNH [herewith designated]: ~~sulphurea~~ [original correction] Smith (MS) Kapaur New Guinea = dohertyi Smith [handwritten] / Palaina ~~sulphurea~~ [original correction] dohertyi Smith Kapaur New Guinea Types. (D....) 1897.7.30.59-60 [handwritten, partly unreadable].

Paralectotype 1 adult BMNH [herewith designated]: same labels as lectotype.

Additional material: 1 adult KGC: INDONESIA E, West Papua, S Bird's Neck, Kaimana 7-9 km NW, 3°35'02"S, 133°42'58"E, 25-200 m, 05.IX.2010, primary lowland rainforest on limestone, leg. K.Greķe; 1 adult KGC: INDONESIA E, West Papua, Onin Peninsula, Fak-Fak 5-7 km N, 2°53'26"S, 132°18'22"E, 300-400 m, 23.IX.2010, primary lowland rainforest on limestone, leg. D.Telnov; 1 adult KGC & 1 adult NME: INDONESIA E, West PAPUA, Onin Peninsula, Fak-Fak 10 km E, 2°56'32"S, 132°23'01"E, Sakarteman vill. 1-4 km W, River Sakarteman valley, 350-450 m, 26.IX.2010, primary lowland rainforest on limestone, leg. K.Greķe; 9 adults KGC, 3 adults, 2 subadults & 4 juv. NME: INDONESIA E, Raja Ampat, Misool Island S, Lilinta (Lelintah) vill. env., 02°02'57,43"S, 130°15'58,11"E, 16 m, 02.II.2012, secondary lowland rainforest on limestone, leg. D.Telnov.

Note: There are confusions with labelling of the types of this species. Originally, these were labelled as '*Palaina sulphurea* Smith (MS)', later this was corrected to '*dohertyi*', but 24.9.1962 note from van Benthem Jutting reads 'These two shells are *Palaina novoguineensis* Smith 1897'. I herewith reconfirm that according to the original description, two shells of '1897.7.30.59-60' belong to *Palaina novoguineensis* but the figures in the original descriptions of both *P. dohertyi* and *P. novoguieneensis* were reversed.

Lectotype designation: Lectotype is selected from two syntyes with identical labels.

References: Smith E.A. (1897: 419, pl. 9 figs 30-31 not 32-33); Kobelt & von Möllendorff (1898: 132), checklist, as *Palaina* Subgen. *Eupalaina* Kob. et. Mlldff. *novo-guineensis*; Kobelt (1902: 402), as *Palaina (Palaina) novoguineensis*; van Benthem Jutting (1963: 703).

Measurements: Lectotype H = 3.7 mm, D = 2.3 mm, HW = 2 mm, PD = 1.8 mm. Specimen from Kaimana env.: H = 4.2 mm, D = 2.7 mm, HW = 2.2 mm, PD = 2 mm. Specimens from River Sakarteman valley: H = 4.1 mm, D = 2.5 mm, HW = 2 mm, PD = 1.9 mm; H = 4.05 mm, D = 2.6 mm, HW = 2.1 mm, PD = 2 mm.

Description: Shell is small, yellowish to pale brown, dextral, obese with conical apex. Shell with 6¼ convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is rather deeply impressed. The penultimate whorl is slightly bulbous in certain specimens. The ultimate whorl is






constricted, narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well defined by presence of a deep and broad impression and a zone of dense axial ribs. The constriction is more or less centered in apertural view. A strong bulb is present just beyond the constriction above the columellar side of the aperture (Plate 42 fig. 13). The teleoconch is sculptured with coarse dense sinuous ribs. There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those of the previous whorls and are oblique to the coiling axis. There are 10-13 ribs per 1 mm. The ribs becoming slightly more distant on the last half whorl. Spiral striae are delicate dense and wavy. The aperture is not tilted to the coiling axis and is circular in type specimens but oval in recent material, apertural rim is entire. The aperture is more or less centered below the penultimate whorl or is slightly shifted right in apertural view. The parietal side of the peristome is pressed against the parietal wall and is completely attached to the ultimate whorl. The peristome is double, consists of numerous dense lamellae in lateral view. The inner peristome forms a continuous polished callus. In specimens from Sakarteman river valley and Kaimana env. the peristome is somewhat expanding parietally and covering over a half of the ultimate whorl in apertural view. The palatal and the basal margins of both peristomes are sinuous. The columella is smooth, glass-like semitransparent, slightly angulate medially (in Kaimana specimen columella is straight and not angulate). In certain specimens columellaris is visible in the aperture as a a flat callus. The operculum is derivative - circular with several concentric ridges on the outer surface.

Ecology: This species occurs in primary lowland rainforests at altitudes up to 450 m.

Distribution: New Guinea: Onin Peninsula and Bird's Neck Isthmus. Raja Ampat Islands: Misool Island.

Conservation status: Least Concern, LC. The current EOO is about 615 km^2. The maximum EOO for this species estimated about 65000 km^2. The current AOO is 12 km^2, the maximum AOO estimated over 2000 km^2 taking into account available habitat. The population size and trend are unknown. Habitat loss and alteration are the main threats. There are three locations. On Onin Peninsula, mostly coastal areas of rainforest are in decline due to the expansion of settlements and building construction activities, while on Bomberai Peninsula lowland areas are intensively logged and converted to gardens. The forested part of the maximum EOO is decreasing constantly. On Bomberai Peninsula between 2001 and 2014 over 28000 ha of the rainforest were lost (calculated for canopy density over 25% according to the Global Forest Watch (2016)). Continuing decline in extent and quality of habitat is observed and projected taking into account constantly growing human population in the area. However, most of Onin Peninsula, Bird's Neck Isthmus and Misool Island remain intact with vast amount of undisturbed habitat available. I can't project any significant habitat decline for the next 10 years. Additional research is required on distribution, population size, as well as on threats for this species.

Palaina (s. l.) ***novopommerana* I. et B. Rensch, 1929** (Fig. 78, plate 42 figs 14-25, map 29)

= *Palaina vexator* I. et B. Rensch, 1929 **syn. nov.** (Plate 42 figs 10-20, 25)

Syntypes *P. novopommerana*: 5 adults MHUB: Zoolog. Museum Berlin [printed] 90932 Palaina novopommerana I.+B.Rensch * Neu-Pommern Weite Bucht Karlei lg. P. Schneider [handwritten] / Zoolog. Museum Berlin. Typ~~us~~en von: [printed, original correction by hand] Palaina novopommerana I. + B.Rensch Zool. Anz. 80, 1929, p. 84, Abb. 4 [handwritten] [label red]; 4 adults FMNH: 123700 [printed] / 123700 FIELD MUSEUM OF NATURAL HISTORY MOLLUSCA: DIPLOMMATINIDAE 4 dry spec. Possible Syntype(s): Palaina novopommerana I. Rensch & B. Rensch, 1929 Sta. JS-123700, Papua New Guinea, Bismarck Archipelago, New-Pommern (= New Britain), Karlei, Malkong Pater J. Schneider! ex W. J. Eyerdam ex Zoologisches Museum Berlin (Acc.# 12584) [printed].

Syntypes *P. vexator* 4 adults MHUB: Zoolog. Museum Berlin [printed] 90938 Palaina vexator I.+B.Rensch * Neu-Pommern Weite Bucht lg. P. Schneider [handwritten] / Zoolog. Museum Berlin. Typus von: [printed] Palaina vexator I. + B.Rensch Zool. Anz. 80, 1929, p. 85, Abb. 5 [handwritten] [label red].

Additional material 1 adult UF: UF 366584 Mollusca, Diplommatinidae 1 specimen(s) *Palaina* Papua New Guinea, East New Britain Province New Britain, 4 km NW Marmar Village along trail to Pakia Village secondary hill forest 450 meters 5.49651° S 151.49027° E Slapcinsky, J. 04-March-2005 JS-0777 drowned in water > 75% ethanol FLORIDA MUSEUM OF NATURAL HISTORY / 777.

Note: In original description of *P. novopommerana* it is stated "Material. 26 Exemplare..." (p. 84), but later "Typus. 5 Exemplare im Zoologischen Museum, Berlin..." (p. 85). Since the total number of syntypes is not clear, lectotype designation is not made (figured specimen cannot be allocated among syntypes).

References *P. novopommerana*: Rensch I. & B. (1929: 84); Rensch I. (1937: 602).






References *P. vexator*: Rensch I. & B. (1929: 85); Rensch I. (1937: 603).
Measurements: Selected syntypes *P. novopommerana* H = 5.1 mm, D = 2.8 mm, HW = 2.7 mm, PD = 2 mm; H = 5.3 mm, D = 2.9 mm; H = 5 mm, D = 2.9 mm; H = 4.9 mm, D = 3 mm; H = 4.7 mm, D = 2.8 mm. Selected syntypes *P. vexator* H = 4.1 mm, D = 2.4 mm, HW = 2.2 mm, PD = 1.7 mm; H = 4.1 mm, D = 2.4 mm; HW = 4.1 mm, PD = 2.2 mm; H = 3.7 mm, D = 2.05 mm. Specimen from Marmar vill. env. H = 4.4 mm.
Description: Shell is very large, white, yellowish or pale brown, sinistral, high conical with conical apex. Shell with 6¼-6½ convex whorls, the 1½-1¾ embryonic whorl is microscopically pitted. The suture is moderately deeply impressed. The ultimate whorl is constricted, about as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult (umbilical crack mentioned by I. Rensch 1937 is a variable character). The constriction is poorly defined by presence of a shallow impression and a zone of stronger sinuous axial ribs. The constriction situated on same axis with the columellar side of the aperture. The teleoconch is sculptured with comparatively fine dense sinuous axial ribs. The ribs are variable: more or less equally spaced throughout the teleoconch and more widely-spaced on the early whorls. The ribs becoming stronger and more widely-spaced on the last half whorl. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls. The ribs range from straight to oblique to the coiling axis. There are 8-12 ribs per 1 mm. Spiral striae are lacking. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. In apertural view the position of the aperture is more or less central below the coiling axis or is slightly shifted left. The peristome is double, consists of several dense lamellae in lateral view. The parietal margin of the peristome is completely attached to the ultimate whorl. The inner peristome forms a broad continuous polished callus. The palatal margins of both peristomes are slightly sinuous. In certain specimens the outer peristome expands strongly beyond the inner one. The columella is broad and smooth, provided with obliquely twisted horizontal columellaris in its basal fourth. The columellaris is directed outwards but is not visible in the aperture. The operculum is derivative - circular and transparent, in a form of a flying disc (impressed on the outer surface), without concentric lines.
Ecology: This species occurs in secondary lowland rainforests. New Britain Island was initially covered by primary lowland to mid montane rainforests.
Distribution: Bismarck Archipelago: New Britain.
Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO. The maximum EOO for this species estimated 145000 km^2 taking into account the area of New Britain, New Ireland and adjacent islets. The current AOO is 4 km^2. The maximum AOO is likely significantly higher, but definitively below the threshold of 500 km^2. The population size and trend are unknown, but Rensch I. (1937) stated this species was found in large quantities. Threats for this species are unknown. Further research is required to uncover present distribution, evaluate population size and highlight threats.

Palaina (s. l.) ***obiensis* sp. nov.** (Figs 79, 138-139, plate 43 figs 1-5, map 6)
http://zoobank.org/AADA0676-CFDD-4F61-9DC1-1B83463F2DEB
Holotype NME: INDONESIA E, North Moluccas, Obi Islands, Obira Is., S part, Wayaloar vill. NE ~4 km, 1°41'01"S, 127°36'13"E, 16.XII.2013, primary and disturbed rainforest, leg. L.Wagner.
Paratypes 42 specimens: 1 subadult KGC: same label as holotype; 15 adults, 1 subadult & 7 juv. UF: UF 426419 Mollusca, Diplommatinidae 22-spec. Palaina sp. 13 Indonesia, Maluku Utara Province Obi Island, border of garden and rainforest 2.3 km N of Woi gardens and rainforest 150 meters -1.7045° 127.6067° John Slapcinsky 26 Oct 2008, JDS-0942 dry FLORIDA MUSEUM OF NATURAL HISTORY [some of paratypes are badly broken]; 14 adults & 1 juv. UF, 3 adult KGC: UF 426284 Mollusca, Diplommatinidae 17-spec. Palaina Indonesia, Maluku Utara Province Obi Island, border of garden and rainforest 2.3 km N of Woi gardens and rainforest 150 meters -1.7045° 127.6067° John Slapcinsky 26 Oct 2008, JDS-0942 75% ethanol FLORIDA MUSEUM OF NATURAL HISTORY.

Derivatio nominis: Toponymic. This species is named after Obi Islands, its area of origin.
Measurements: Holotype H = 2.1 mm, D = 1.3 mm, HW = 1.3 mm, PD = 0.9 mm. Paratype from locus typicus: H = 2.1 mm, D = 1.3 mm, HW = 1.15 mm, PD = 0.75 mm. Selected paratypic specimens from Woi vill. env.: H = 2.3 mm, D = 1.4 mm, HW = 1.3 mm, PD = 0.95 mm; H = 2.3 mm, D = 1.4 mm, HW = 1.3 mm, PD = 0.9 mm; H = 2.2 mm, D = 1.3 mm, HW = 1.25 mm, PD = 0.9 mm.
Description: Shell is small, pale brown or white, sinistral, cylindrical with conical apex. Shell with 6 convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is constricted, about as wide as the penultimate whorl in apertural view. The um-






bilicus is closed in adult. The constriction is well defined by presence of a short shallow impression, denser pattern and height reduction in axial ribs and suture deeply impressed above the constriction. The constriction situated on same axis with the columellar side of the aperture. The teleoconch is sculptured with lamella-like and widely-spaced straight ribs. The ribs becoming much stronger, higher and somewhat more widely-spaced on the last half whorl. There are abrupt changes in the ribbing pattern at the constriction area (see above). The ribs are partially synchronized with those of the previous whorls and are slightly oblique to the coiling axis. There are 4-5 ribs per 0.5 mm but about 10-12 ribs per 0.5 mm at the constriction. Spiral striae are lacking at 300x magnification on younger whorls. On older teleoconch whorls a very delicate spiral striae are present at 300x magnification (4-5 rows of spiral striae per 30 µm). The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, thin in lateral view. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a narrow continuous polished callus. The outer peristome is broadly discontinued parietally. The palatal margin of the outer peristome is somewhat sinuous. In fully grown specimens the area of the parietal / palatal junction of the outer peristome expands into an obtuse protruding. The columella is smooth, slightly twisted medially and provided with a flat glass-like semitransparent basal knob. The operculum is derivative - circular and transparent, concave on the outer surface and with a rudiment of a concentric line.

Differential diagnosis: This species is distinctive among all other congeners due to the combination of the following characters: axial ribs widely-spaced, rather high and lamella-like becoming much denser at the constriction. Spiral striae are lacking at 300x magnification on early whorls but is present on early whorls, the columella is provided with outwards directed basal knob.

Ecology: This species inhabits both primary and disturbed lowland rainforest and gardens.

Distribution: Southernmost North Moluccas: Obira Island of Obi Islands group.

Conservation status: Data Deficient, DD. This species known from southern part of Obira, the main island of Obi group. Not enough data available to calculate current EOO. The total area of Obi Islands is about 5100 km^2. It is very unlikely *Palaina obiensis* sp. nov. occurs all over Obi Islands and only small fractions of Obi rainforests known to be located on limestone soils. Consequently, the maximum EOO for this species is certainly below 5000 km^2. The current AOO is 8 km^2, but the maximum AOO estimated up to 2000 km^2. The area of Obi Islands covered by rainforests is decreasing continuously, between 2001 and 2014 about 11000 ha of the rainforest were lost (calculated for canopy density over 25% according to the Global Forest Watch (2016)). Considering rapidly growing human population of the Moluccas together with presence of large nickel mine in W Obira (which attract additional workers from other regions of Indonesia), this trend is likely to continue. On the other hand, *P. obiensis* sp. nov. found also in gardens and secondary rainforests. There is no confirmation the population is suffering from habitat degradation. Two location are known. Additional basic research is required. Threats to be highlighted for this species.

Palaina (s. l.) ***onin*** **sp. nov.** (Fig. 80, plate 43 figs 6-12, map 27)

http://zoobank.org/AD43FC3E-721E-4046-B97D-050AAF383939

Holotype NME: INDONESIA E, West PAPUA, Onin Peninsula, Fak-Fak 10 km E, 2°56'32"S, 132°23'01"E, Sakarteman vill. 1-4 km W, River Sakarteman valley, 350-450 m, 26.IX.2010, primary lowland rainforest on limestone, leg. K.Greķe.

Paratypes 12 specimens: 2 adults, 2 subadult & 2 juv. KGC, 1 adult, 2 subadults & 4 juv. NME: same label as holotype.

Derivatio nominis: Toponymic. This species is named after Onin Peninsula and a local language in the area where this species occurs. Noun in apposition, invariable.

Measurements: Holotype H = 2.4 mm, D = 1.6 mm, HW = 1.8 mm, PD = 1.2 mm. Selected paratypic specimen H = 2.35 mm, D = 1.6 mm, HW = 1.5 mm, PD = 1 mm.

Description: Shell is small, yellowish to pale brown, sinistral, obese with conical apex. Shell with 5½ strongly convex whorls, the 1½ embryonic whorl is smooth. The suture is deeply impressed. The ultimate whorl is strongly constricted, narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well defined by a short zone of stronger oblique and denser axial ribs and the suture with a cavity-like impression above the constriction. The constriction is more or less centered in apertural view. The protoconch is placed oblique on the rest of the shell. The teleoconch is sculptured with very delicate dense slightly sinuous axial ribs. There are no









abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are slightly oblique to the coiling axis. There are 6-7 ribs per 0.5 mm. The ribs becoming more distant and coarser on the last half whorl. Spiral striae are distinct, delicate and dense. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, thick in lateral view. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a continuous polished callus. The columellar margin of the inner peristome is sinuous or slightly sinuous. The outer peristome is thick (in lateral view), provided with two obtuse protrudings - one on each the palatal and the columellar margins (Plate 43 figs 6, 8-9). The palatal and the columellar margins of the outer peristome are sinuous. The basal margin of the outer peristome is reflexed. The columella is smooth, narrow and provided with a median columellaris. The operculum is derivative - thin and transparent, in a form of a flying disc with raised margin, small and narrow Γ-like median protruding ("handler") on the inner surface, bears concentric lines.

Differential diagnosis: This species is conchologically very similar to *Palaina bicornis* van Benthem Jutting, 1958 and *P. misoolensis* sp. nov. (both from Misool Island), but is specifically different (consider characters discussed in table 16).

Table 16. Papuan species of *Palaina* s. l. similar to *P. onin* sp. nov. and their distinctive characters.

Species	**Character**	**Character in *P. onin* sp. nov.**
Palaina bicornis	the operculum with large and broad straight median protruding, without concentric lines, spiral striae less distinct, shell broadly fusiform, the penultimate whorl clearly the widest, the ultimate whorl constricted.	the operculum with short and narrow Γ-like median protruding, with concentric lines, spiral striae are distinct, shell broadly cylindrical, the penultimate whorl the widest, the ultimate whorl is weakly constricted.
P. misoolensis sp. nov.	the columella with a median knob which is visible in the aperture in lateral view, the operculum without concentric lines, shell broadly fusiform with the penultimate whorl clearly the widest, strongly conical and constricted on the ultimate whorl.	the columella without knob, the operculum with concentric lines, shell either broadly cylindrical, obese, with the penultimate whorl the widest but conical and the ultimate whorl is weakly constricted.

Ecology: This species was found in primary lowland rainforest on limestone in leaf litter on the undersides of fallen leaves. Reported from altitudes of 350-450 m.

Distribution: New Guinea: Onin Peninsula.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO. The maximum EOO estimated over 4000 km^2 taking into account the area of Onin Peninsula and available habitat. The current AOO is 4 km^2. The maximum AOO is likely much higher. The population size and trend are unknown. Onin Peninsula is still very pristine and covered by primary rainforests for over 75%. However, human population is growing and local development is ongoing, especially in coastal areas. Hitherto no large scale deforestation documented for Onin Peninsula. Significant decline in EOO, AOO or quality of habitat cannot be projected for this species within next 10 years. Further research is required on distribution of this species, its population trend and on threats.

Palaina (s. l.) ***papuamontis* sp. nov.** (Fig. 81, plate 43 figs 13-20, map 27)

http://zoobank.org/1A31D4CB-CE9D-4103-B655-8A596ED7BA7C

Holotype UF (No 508075): UF 475413 Mollusca, Diplommatinidae, 6-spec. *Palaina* Papua New Guinea, Hela province Kielokana, 3.9 km SW of Tangi 2172 meters mossy pandanas [sic!] forest -5.6683° 142.624° 3 Apr 2009, JDS-0974 John Slapcinsky, Robert Lasley 75% ethanol FLORIDA MUSEUM OF NATURAL HISTORY [printed] / JS 974 [handwritten].

Paratypes 31 specimens: 5 adults & 1 subadult UF: same labels as holotype; 16 adults, 4 subadults & 1 juv. UF, 4 adults KGC: UF 475459 Mollusca, Diplommatinidae, 2-spec. *Palaina* Papua New Guinea, Hela province large sinkhole, 6.1 km SW of Tangi 2400 meters forested sinkhole -5.6781°, 142.6161° 4 Apr 2009, JDS-0975 John Slapcinsky, Robert Lasley 75% ethanol FLORIDA MUSEUM OF NATURAL HISTORY [printed] / JS-975 [handwritten].

Derivatio nominis: This species is named from a combination of Papua + Latin "montis" [mount], what should point on a connection with New Guinean mountains where this new species occurs. Noun in apposition, invariable.









Measurements: Holotype H = 2.2 mm, D = 1.3 mm, HW = 1.2 mm, PD = 0.8 mm. Selected paratypic specimens: H = 2.25 mm, D = 1.4 mm, HW = 1.25 mm, PD = 0.8 mm; H = 2.2 mm, D = 1.2 mm, HW = 1.2 mm, PD = 0.75 mm; H = 2.1 mm, D = 1.2 mm, HW = 1.1 mm, PD = 0.7 mm; H = 1.95 mm, D = 1.2 mm, HW = 1.1 mm, PD = 0.75 mm; H = 1.95 mm, D = 1.15 mm, HW = 1.2 mm, PD = 0.7 mm; H = 1.9 mm, D = 1.1 mm, HW = 1.1 mm, PD = 0.7 mm.

Description: Shell is small, whitish, yellowish or pale brown, sinistral, cylindrical, with conical apex. Shell with 5½ convex whorls, the 1½ embryonic whorl is microgranulate. The suture is deeply impressed. The ultimate whorl is constricted, nearly as wide as the penultimate whorl in apertural view. Umbilicus is very narrowly open in adult, perspective. The constriction is very poorly defined by a short zone of slightly denser axial ribs. The constriction is more or less centered in apertural view. The teleoconch is sculptured with delicate dense straight axial ribs. The ribs becoming very flat and slightly curved on the upper part of the teleoconch whorls (Plate 43 fig. 17). Therefore a narrow smooth spiral line developed on the top of all teleoconch whorls. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are straight or almost straight to the coiling axis. There are 9-11 ribs per 0.5 mm. The ribs becoming stronger but not more distant on the last half whorl. Spiral striae are very delicate and dense. The aperture is not tilted against the coiling axis, ascending, circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is simple, forms a narrow continuous polished callus which is discontinued parietally. There are 2-3 strong lamellae on tuba near the peristome in lateral view. The parietal margin of the peristome is attached to the ultimate whorl. The margins of the peristome are not sinuous. The columella is smooth and broad, with a flat median callus which is directed backwards. The operculum is derivative - circular, rather high, consist of several layers of concentric ridges, with a medial hollow on the inner surface.

Differential diagnosis: This species is conchologically very similar to *Palaina citrinella* van Benthem Jutting, 1963 (northern New Guinea: Lake Sentani surroundings) but differs specifically in smaller shell (2.25 mm compared to 3.5 mm in *P. citrinella*) with narrowly open umbilicus (the umbilicus is closed in *P. citrinella*) and axial ribs disappearing on the top of the teleoconch whorls (axial ribs are complete in *P. citrinella*). *Palaina erythropeplos* van Benthem Jutting, 1958 (Misool Island) is similar in shell shape and narrowly open umbilicus but is significantly larger (H = 3.4-4 mm), has the ultimate whorl significantly broader than the penultimate whorl (in apertural view) and the aperture is broader in this species than in *P. papuamontis* sp. nov.

Ecology: This species occurs in primary mid montane rainforests at altitudes about 2050-2200 m.

Distribution: Central Cordillera: Hela Province of PNG.

Conservation status: Near Threatened, NT. Not enough data available to calculate current EOO. The maximum EOO for this species estimated about 1000 km^2 taking into account the area of mid montane rainforests around the locus typicus. The current AOO is 8 km^2, maximum AOO estimated much less than 500 km^2. According to the Global Forest Watch (2016), montane area covered by rainforest around the locus typicus of *Palaina papuamontis* sp. nov. is currently stable and almost unaffected by deforestation, but deforestation is rapidly ongoing in lower areas - adjacent valleys. Hitherto, major threats are unknown for *P. papuamontis* sp. nov. and further research activities are required to evaluate population size, trend and highlight threats.

Palaina (s. str.) ***papuanorum* Soós, 1911** (Plate 43 figs 21-24, map 26)

Lectotype NMNL: Sattelberg.

References: Soós (1911: 349); Leschke (1912a: 145); van Benthem Jutting (1963: 703); Wiktor (1998: 19), lectotype designation.

Measurements: Lectotype H = 2.4 mm, D = 1.3 mm, HW = 1.2 mm, PD = 1 mm.

Description: Shell is small, whitish with corneous coloured apical whorls, sinistral, rather broadly conical with conical apex. Shell with 5½ slightly convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. The penultimate whorl is large and bulbous. The ultimate whorl is constricted, descending, it is much narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well defined by a shallow impression and a zone of denser placed axial ribs. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse distant straight or slightly sinuous axial ribs. The ribs are 2-3x denser on earlier whorls. The ribs becoming dense on the apertural side of the ultimate whorl and getting very widely-spaced again on the rest of tuba. There are abrupt






changes in the ribbing pattern - early whorls with denser axial ribs which become abruptly replaced by distant ribs on last two whorls. The ribs are partially synchronized with those of the previous whorls and are oblique to the coiling axis. There are 9 ribs per 1 mm, but twice more at the constriction. Spiral striae are very delicate. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is shifted left against the coiling axis in apertural view. The peristome is double, with a zone of dense irregularly sinuous lamellae on the ultimate whorl prior the aperture in lateral view. The parietal margin of the peristome is not fully attached to the ultimate whorl. The inner peristome forms a broad continuous polished callus. No specimens were available to study the internal lamellae. Operculum is unknown.

Ecology: According to its original description, type series collected "in woods, under fallen leaves" Soós (1911).

Distribution: New Guinea: northern (West Sepik Province, PNG) and eastern (Morobe Province, PNG) coast.

Conservation status: Data Deficient, DD. This species known from over 100 years old record and has not been collected again. Its distribution, habitat and threats remain unknown.

Remark: 25 specimens mentioned by Soós (1911) for the type series and Seleo Island (small islet offshore northern New Guinea) is given as the locus typicus. Wiktor (1998) designated one specimen from Sattelberg (Huon Gulf, eastern New Guinea) as the lectotype saying "there exist [sic!] only a single specimen, designated as a syntype, that has been transferred from L. Soós's collection to that of Amsterdam". Another 24 syntypes got lost in the fire in the Hungarian Natural History Museum. It remains unknown why the present lectotype has a different label from what is mentioned in the original description of this species.

Palaina (s. l.) ***paradisaea*** **sp. nov.** (Fig. 82, plate 44 figs 1-7, map 21)

http://zoobank.org/C6A7FED1-AE26-463A-B812-3BF23F66B9D6

Holotype NME: INDONESIA E, Raja Ampat, Waigeo Island, Majalibit Bay, Waisai 19 km NE, River Werabiai valley, 00°18'02"S, 130°56'00"E, 40-60 m, 20.II.2012, primary lowland rainforest on limestone, leg. D.Telnov.

Paratypes 9 specimens: 4 adults KGC & 3 adults NME: same label as holotype; 2 adults KGC: INDONESIA E, Raja Ampat, Waigeo Island, Waisai 10 km NWW, 00°24'46"S, 130°44'11"E, 70-200 m, 19.II.2012, primary lowland rainforest on limestone, leg. D.Telnov.

Derivatio nominis: This species was found near the lekking ground of Wilson's bird-of-paradise therefore the name for this new species should point to the habitat connection of this tiny soil snail and the Bird-of-paradise. The name may also refer to Raja Ampat enigmatic landscape and untouched nature.

Measurements: Holotype H = 1.9 mm, D = 1.1 mm, HW = 0.95 mm, PD = 0.8 mm. Selected paratypic specimens from type locality: H = 1.95 mm, D = 1.15 mm, HW = 0.95 mm, PD = 0.8 mm; H = 1.8 mm, D = 1.1 mm, HW = 1 mm, PD = 0.75 mm. Selected paratype from 10 km NWW Waisai: H = 2 mm, D = 1.15 mm, HW = 1.1 mm, PD = 0.9 mm.

Description: Shell is very small, pink, yellowish or pale brown, sinistral, cylindrical with flattened apex. Shell with 5¼ convex whorls, the 1¼ embryonic whorl is microscopically pitted. The suture is rather deeply impressed. The ultimate whorl strongly constricted, nearly as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by shallow impression on the suture above it. The constriction situated on same axis with the columellar side of the aperture. The teleoconch is sculptured with delicate dense straight axial ribs. There are abrupt changes in the ribbing pattern - the ribs becoming coarser and twice more distant beyond the constriction. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are 12-13 ribs per 0.5 mm. Spiral striae are delicate, very dense. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, thick in lateral view. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a continuous polished callus. The palatal and columellar margins of the inner peristome are strongly sinuous, of the outer peristome - less strongly sinuous. The inner peristome provided with obtuse ear-like protrudings on the parietal / palatal and the columellar / parietal junctions (Plate 44 figs 1, 3-4). The outer peristome is broadly discontinued parietally. The columella is smooth and glass-like semitransparent, provided with a large backwards directed knob all along its length. The operculum is derivative - in a form of a flying disc, with raised margin and concentric lines.

Differential diagnosis: This species is distinctive among all congeners due to the combination of the following characters: shell cylindrical, the inner peristome with two protrudings on the palatal






and the columellar margins, Columella with a large knob which is directed backwards.
Ecology: This species occurs in primary lowland rainforests on limestone soils at altitudes 40-200 m. Specimens observed in wet leaf litter and under decaying wood at base of limestone outcrops and in deep leaf litter accumulated at buttress roots of large trees.
Distribution: Raja Ampat Islands: Waigeo Island.
Conservation status: Least Concern, LC. This species inhabits both western and eastern peninsulas of Waigeo, hitherto recorded from localities in the southern part of the island. Not enough data available to calculate current EOO. The maximum EOO estimated below 5000 km^2 (the area of Waigeo Island and adjacent islets considering available habitat). The current AOO is 8 km^2, but maximum AOO estimated below 500 km^2. The population size is unknown, but *P. paradisaea* sp. nov. is locally abundant. The population is not yet fragmented. The main threats are habitat lost and altering due to conversion of rainforests into gardens, timber collecting and small-scale logging. Growing human population of southern Waigeo and increasing tourism in the area (both national and international) demand more gardens, roads and resorts. Waigeo got a regency capital of Raja Ampat administrative province of Indonesia resulting in boosting development. Waigeo is rich in limestone rocks which are widely used for roads and buildings construction. Growing population (partly a result of immigration from other islands of Indonesia) requires more firewood and charcoal. *P. paradisaea* sp. nov. was not observed in disturbed forests but probably will survive also in a secondary lowland rainforests with closed canopy (wet litter is the key). Between 2001-2014 south-western Waigeo lost just about 1100 ha of the rainforest (calculated for canopy density over 25% according to the Global Forest Watch (2016)) but not in the area where *P. paradisaea* sp. nov. occurs. Therefore I can't project significant decline in AOO or EOO for this species within next 10 years. Additional basic research is required.

Palaina (s. l.) ***perspectiva*** **sp. nov.** (Figs 83-84, plate 44 figs 8-11, map 24)

http://zoobank.org/B1FE2EC8-6207-4FF8-BCC0-AF0C98EA46B5

Holotype NME: INDONESIA E, W New Guinea, Doberai Peninsula, Ayamaru vill. ~15,5-14 km N, 1°08'04"S, 132°10'59"E to 1°09'29S, 132°11'30"E, ~275-250 m, 02.IX.2015, primary lowland rainforest on limestone, leaf litter, leg. D.Telnov.
Paratype 1 adult KGC: same label as holotype.

Derivatio nominis: Named from Latin "perspecto" to point out wide shell umbilicus of this species.
Measurements: Holotype H = 2.6 mm, D = 1.85 mm, HW = 1.6 mm, PD = 1.4 mm. Paratype H = 2.8 mm, D = 1.9 mm, HW = 1.5 mm, PD = 1.35 mm.
Description: Shell is small, white (body yellow), sinistral, conical with a conical apex. Shell composed of 5¾ convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is constricted and is about as wide as the penultimate whorl in apertural view. The umbilicus in adult shells is very broadly open and perspective for about one whorl. The constriction is well defined by a short shallow impression and much denser pattern of axial ribs. The constriction situated on same axis with the columellar side of the aperture. The protoconch is placed oblique on the rest of the shell. The teleoconch is sculptured with coarse widely-spaced and distinctly sinuous axial ribs (like high lamellae). The ribs becoming coarser and more widely-spaced on the last half whorl. At the constriction the ribs are 3x denser. The ribs are not synchronized with those on the previous whorls and are oblique to the coiling axis. There are 5-6 ribs per 0.5 mm. Spiral striae are very delicate and dense. The aperture is not tilted against the coiling axis is circular and has entire peristomal rim. The aperture is shifted left against the coiling axis in apertural view. The peristome is double and thin in lateral view. The ultimate whorl with a broad zone of dense lamellae prior to the aperture. The parietal margin of the inner peristome is attached to the ultimate whorl. The inner peristome forms a continuous polished callus. The outer peristome is broadly discontinued parietally. The palatal, basal and columellar margins of both peristomes are sinuous or slightly sinuous. The columella is broad, strongly widening at base. Operculum is unknown.
Differential diagnosis: This is very distinctive species due to the strongly left shifted aperture, lamella-like axial ribs and broadly open umbilicus.
Ecology: Specimens sampled from leaf litter in primary lowland rainforest on limestone.
Distribution: New Guinea: lowlands of Doberai Peninsula.
Conservation status: Near Threatened, NT. Not enough data available to calculate current EOO. The maximum EOO for this species estimated 8-10000 km^2 taking into account its possible distribution on southern Doberai Peninsula. The current AOO is 4 km^2, but maximum AOO estimated significantly larger. The population size is unknown, but this species was only found at one site in the






region, where over 25 sites were sampled. Habitat loss and the decline in habitat quality caused by logging, mining, and conversion of forests into gardens and plantations, as well as due expansion of settlements in lowland areas are the main threats. Between 2001 and 2014 more than 10000 ha of rainforest were lost in S Doberai (calculated for 25% canopy density, according to the Global Forest Watch (2016)). Continuing decline in extent and quality of habitat is observed and projected taking into account constantly growing human population of Doberai Peninsula. Further basic research is essential in order to clarify population size and trend and highlight threats.

Palaina (s. l.) ***polystoma* B. Rensch, 1931** (Figs 85 & 98, plate 44 figs 12-20, map 14)

Holotype MHUB: Sunda-Expedition Rensch Fundort: [printed] Rana Meré (12-1300 m) W. Flores [handwritten] Datum: [printed] 19.-29.6.27 [handwritten] No: [printed] / Zoolog. Museum Berlin [printed] Palaina polystoma Rensch * Rana Meré, W. Flores 19.-29.6.27. Rensch leg 75441 [handwritten] / Zoolog. Museum Berlin. Typus von: [printed] Palaina polystoma Rensch Zool. Jahrb. Syst., 61, p. 395, Fig. 15,1931 [handwritten] [label red].

Additional material: 3 KGC: INDONESIA, Nusa Tenggara, Flores Is., Gn. Ranaka mt., 08°37.321'S, 120°31.463'E, 1535 m, 08.III.2011, primary lower montane rainforest, soil sample No 1, leg. A.Riedel; 4 KGC & 2 NME: INDONESIA, Nusa Tenggara, Flores Is., Gn. Ranaka mt., 08°38.099'S, 120°31.745'E, 2205 m, 09.III.2011, primary mid montane rainforest, soil sample No 3, leg. A.Riedel; 1 KGC: INDONESIA, Nusa Tenggara, Flores Is., Gn. Ranaka mt., 08°37.781'S, 120°31.184'E, 1730 m, 10.III.2011, primary mid montane rainforest, soil sample No 8, leg. A.Riedel; 4 KGC: INDONESIA, Nusa Tenggara, Flores Is., Gn. Ranaka mt., 08°37.641'S, 120°31.204'E, 1685 m, 10.III.2011, primary lower montane rainforest, soil sample No 9, leg. A.Riedel; 4 KGC: INDONESIA, Nusa Tenggara, Flores Is., Gn. Ranaka mt., 08°37'48.1"S, 120°31.41'E, 1610 m, 10.III.2011, primary lower montane rainforest, soil sample No 10, leg. A.Riedel; 8 KGC & 8 NME: INDONESIA, Nusa Tenggara, Flores Is., Gn. Ranaka mt., 08°37.386'S, 120°31.156'E, 1575 m, 10.III.2011, primary lower montane rainforest, soil sample No 11, leg. A.Riedel; 1 KGC: INDONESIA, Nusa Tenggara, Flores Is., Tebedo, 08°29.848'S, 119°59.633'E, 525 m, 14.III.2011, primary lowland rainforest, soil sample No 1, leg. A.Riedel.

References: Rensch B. (1931: 390).

Measurements: Holotype H = 3.5 mm, D = 1.95 mm, HW = 1.8 mm, PD = 1.5 mm. Selected specimens from Mt. Ranaka, Flores Island: H = 3.5 mm, D = 1.9 mm, PD = 1.55 mm; H = 3.3 mm, D = 1.85 mm, PD = 1.55 mm; H = 3.3 mm, D = 1.9 mm, PD = 1.6 mm; H = 3.1 mm, D = 1.8 mm, PD = 1.5 mm. Specimen from Tebedo, Flores Island: H = 3.9 mm, D = 2.2 mm, PD = 1.65 mm.

Description: Shell is large, pale brown, dextral, cylindrical with conical apex. Shell with 7 convex whorls, the $1^1/_2$ embryonic whorl is microscopically pitted. The suture is moderately deeply impressed. The ultimate whorl is constricted, as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is delimited by a flat impression. The constriction is more or less centered in apertural view. There is a strong bulb just beyond the constriction above the columellar side of the aperture. The teleoconch is sculptured with fine very dense straight or slightly sinuous axial ribs. The ribs becoming very widely-spaced and strong on the last half whorl. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are about 35 ribs per 1 mm, but about 22 ribs on the apertural side of the ultimate whorl. Spiral striae are lacking. The aperture is not tilted against the coiling axis, is oval and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, very thick in lateral view and consists of numerous delicate lamellae. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a very broad continuous polished callus. The margins of the inner peristome are not or slightly sinuous. The outer peristome is broadly discontinued parietally, its palatal margin is slightly sinuous. The columella is shny, slightly twisted and widened basally, provided with a small glass-like semitransparent basal callus. The columella is visible in the aperture in a form of a flat callus. The operculum is derivative - circular with concentric ridges on the outer surface.

Ecology: This species inhabits primary lowland, lower and mid montane rainforests up to 2200 m altitude. Specimens occur in wet leaf litter, usually on undersides of fallen leaves.

Distribution: Lesser Sunda Islands: Flores Island.

Conservation status: Endangered, EN B2ab(ii,iii). The current EOO is ~400 km^2. The maximum EOO estimated ~15000 km^2 taking into account the area of Flores and adjacent islands. The current AOO is about 21 km^2, however the maximum AOO is likely higher, but definitively below 500 km^2. The population size and trend are unknown, but *Palaina polystoma* is not uncommon in primary rainforests on Flores. The population is not severely fragmented, but the grade of fragmentation is likely






to increase. The main threats for this species are loss and altering of the habitat due to timber collecting, small-scale logging and expansion of gardens. This results in habitat alteration, fragmentation and decline in the AOO. Growing human population of Flores combined with more frequent and longer dry periods caused by global warming and El Niño weather patterns will likely have continued negative effect on the remaining natural rainforests of Flores. Between 2001 and 2014, Flores, its adjacent islands of Lembata, Adonara, Solor and Rinca lost almost 29000 ha of rainforest (calculated for canopy density over 25% according to the Global Forest Watch (2016)). This trend is likely to cause a continuing decline in the AOO. There are two known locations for *P. polystoma*.

Palaina (s. l.) ***ponsonbyi* Sykes, 1903** (Plate 44 figs 21-25, map 20)

Holotype BMNH: ~~Diplom. sp.~~ [original correction] Palaina ponsonbyi Sykes Waigiou I. 1903.7.11.30-2 [handwritten] / ponsonbyi, Sykes. Waigiou I. [handwritten].
Paratypes 5 adults: 2 BMNH: same labels as holotype; 1 MMUE: [one circular label with written on both sides] D. (Palaina) ponsonbyi Sykes Waigiou. Cotype [handwritten, upper side] EE3846. Diplommatina Palaina ponsonbyi Sykes Waigiou Co-type [handwritten, under side] / 1028 [printed]; 2 FMNH: 72960 [printed] / 72960 FIELD MUSEUM OF NATURAL HISTORY MOLLUSCA: DIPLOMMATINIDAE 2 dry spec. Paratype(s): Palaina ponsonbyi Sykes, 1903 Sta. FMNH72960, Indonesia, West Papua, New Guinea, Waigiou ex F.F. Laidlaw ex E.R. Sykes (Acc.# 11666) [printed].
Additional material 10 adults, 2 subadult & 1 juv. LKCNHM: Indonesia: West Papua [sic!], Waigeo, Lopintol, Gua Kalepale. Leg. T. Whitten, Jan. 2013.

References: Sykes (1903a: 66); Sykes (1903b: 78, pl. 6 fig. 13); van Benthem Jutting (1963: 703).
Measurements: Holotype H = 4.8 mm, D = 2.4 mm, HW = 2.3 mm, PD = 2 mm; Selected specimens from Lopintol vill.: H = 4.75 mm, D = 2.5 mm, HW = 2.3 mm, PD = 1.6 mm; H = 4.6 mm, D = 2.4 mm, HW = 2.1 mm, PD = 1.6 mm; H = 4.5 mm, D = 2.2 mm, HW = 2.35 mm, PD = 1.7 mm.
Description: Shell is very large, pale brown, sinistral, high conical with conical apex. Shell with 7 convex whorls, the 1¾ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is constricted, about as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well delimited by a short, moderately deep impression and abruptly changing ribbing pattern (the axial ribs becoming denser at the constriction). The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse dense irregular sinuous axial ribs. The ribs widen lamella-like on the uper parts and bent in a direction opposite to the coiling axis. In holotype, the ribs becoming very distant and strong on the last half whorl (however, this specimen has a kind of aberrant shell). The ribs are conspicuously less strong in paratypic specimen from MMUE. There are abrupt changes in the ribbing pattern in the (aberrant) holotype only (see above), but not in recent material or paratypes. The ribs are not synchronized with those of the previous whorls and are oblique to strongly oblique to the coiling axis. There are about 9-12 ribs per 1 mm, but ~14-16 ribs per 1 mm at the constriction. Spiral striae are lacking. The aperture is not tilted against the coiling axis, is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view or is slightly shifted left. The peristome is double and broad, consists of several thin lamellae. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a continuous polished callus, expands and covers over a half of the ultimate whorl in apertural view. The margins of the inner peristome are not sinuous or the palatal margin is slightly sinuous. The outer peristome is broadly discontinued parietally (not in MMUE paratype), its palatal margin is slightly sinuous. The columella is simple and flat. Operculum is unknown.
Ecology: Unknown. Waigeo Island is covered by primary lowland rainforests on limestone soils.
Distribution: Raja Ampat Islands: Waigeo Island, Majalibit Bay. Co-ordinates of Gua [cave] Kalepale are 00°17'18"S, 130°49'15"E, but no information is available where exactly these specimens were sampled.
Conservation status: Data Deficient, DD. This species is known from four specimens collected over 115 years ago as well as from a small series of recently collected material. Exact locality on Waigeo is unknown for historical specimens. Not enough data available to calculate current EOO. The current AOO is 4 km^2. The maximum EOO is definitively below the threshold of 500 km^2 (the total area of Waigeo and adjacent islets considering available habitat). Further research is required on population size of this species and its threats.

Palaina (s. l.) ***propinqua* van Benthem Jutting, 1963** (Plate 44 figs 26-29, map 27)

Holotype NMNL: Papua, Biak, Jobdi, Afd. Mariniers Nieuw Guinea, 1953.




Paratypes 4 adults NMNL: Yapen Island, sago swamp near Sarmi, along road to the airport.

References: van Benthem Jutting (1963: 708, pl. 29 fig. 29).
Measurements: Holotype H = 3.3 mm, D = 2.1 mm, HW = 1.65 mm, PD = 1.6 mm.
Description: Shell is large, whitish, sinistral, obese with flattened apex. Shell with 6 strongly convex whorls, the $1^1/_2$ embryonic whorl is microscopically pitted. The suture is moderately deeply impressed. The penultimate whorl is slightly bulbous. The ultimate whorl slightly constricted and ascending, narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well defined by a broad impression. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse dense sinuous axial ribs. The ribs becoming more widely-spaced and strong on the last half whorl. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are about 10-11 ribs per 1 mm. Spiral striae are lacking. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, thick in lateral view and consists of several thin lamellae. The parietal margin of the peristome is not fully attached to the ultimate whorl. The inner peristome forms a very broad continuous polished callus, expands and covers most of the ultimate whorl. The columellar margins of both peristomes are slightly sinuous. No specimens were available to study the internal lamellae. Operculum is unknown.
Ecology: On Yapen this species was sampled in sago swamp.
Distribution: Cenderawasih Bay Islands: Biak Island, Yapen Island.
Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. The maximum EOO for this species is not clear since *P. propinqua* is not limited to Biak Island and also inhabits Yapen. The fauna of Yapen is shared with Waropen region of New Guinea. Since this species was found in coastal sago swamp on Yapen and taking into account that most of Waropen region is also swampy, occurrence of *P. propinqua* on this part of New Guinea could not be excluded. The maximum AOO estimated over the threshold of 500 km^2. This species is known from a series sampled about 70 years ago and has not been collected again. Threats for this species are unknown. Sago swamps are generally not threatened in the Papuan Region. Further research is required to highlight status of *P. propinqua* in the wild, calculate population size, clarify its trend and clarify threats for the population.

Palaina (s. l.) ***psittricha*** **sp. nov.** (Figs 86 & 142, plate 45 figs 1-9, map 16)
http://zoobank.org/5A4090D4-4D57-44B0-91CD-E5FE5F1A9B54
Holotype NME: INDONESIA E, Raja Ampat, Misool Island (central), River Gam upstream, Gamta vill. 12-14 km NW, 01°57'50"S, 130°11'09"E, 350 m, 06.II.2012, primary lowland rainforest on limestone, leg. D.Telnov.
Paratypes 43 specimens: 28 adults KGC & 10 adults NME: same label as holotype; 4 adults & 1 juv. KGC: INDONESIA E, Raja Ampat, Misool Island (central), River Gam upstream, Gamta vill. 12-14 km NW, 01°57'50"S, 130°11'09"E, 350 m, 06.II.2012, primary lowland rainforest, limestone rocks, leg. D.Telnov.

Derivatio nominis: This species is named after the Papuan endemic Pesquet's parrot *Psittrichas fulgidus* (Lesson, 1830). The first observation of Pesquet's parrot from Misool Island (not yet published) was made by Dmitry Telnov at the same day when *Palaina psittricha* sp. nov. specimens were sampled. This epithet is an adjective.
Measurements: Holotype H = 1.7 mm, D = 1 mm, HW = 0.8 mm, PD = 0.7 mm. Selected paratypic specimens from locus typicus: H = 1.8 mm, D = 0.95 mm, HW = 0.8 mm, PD = 0.7 mm; H = 1.65 mm, D = 0.95 mm, HW = 0.7 mm, PD = 0.6 mm; H = 1.65 mm, D = 0.9 mm, HW = 0.8 mm, PD = 0.7 mm.
Description: Shell is very small, white or yellow with yellow body, sinistral, cylindrical with conical apex. Shell with 6 convex whorls, the $1^1/_2$ embryonic whorl is microscopically pitted. The suture is deeply impressed. The protoconch is placed somewhat oblique on the rest of the shell. The ultimate whorl is slightly constricted, narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. There is a vague sutural impression above the constriction. The constriction is more or less centered in apertural view. The teleoconch is sculptured with delicate dense straight or slightly sinuous ribs. There are abrupt changes in the ribbing pattern - the ribs becoming coarse and twice more distant beyond the constriction. The ribs are not synchronized with those of the previous whorls and are slightly oblique to the coiling axis. There are about 9-10 ribs per 0.5 mm. Spiral striae are very delicate and dense. The aperture is not tilted






to the coiling axis and is circular and has entire apertural rim. The position of the aperture is slightly shifted left the coiling axis in apertural view. The peristome is double, thick and consists of several dense lamellae in lateral view. The parietal margin of the peristome is attached to the ultimate whorl. In certain specimens the palatal and the columellar margins of both peristomes are slightly sinuous. The inner peristome forms a continuous polished callus. The outer peristome is broadly discontinued parietally. The columella is simple and shiny, slightly widening basally. The operculum is derivative - circular and high, consist of several layers of concentric ridges.

Differential diagnosis: Most similar to *Palaina adelpha* Soós, 1911 (Eastern New Guinea) and *P. flavocylindrica* sp. nov. (Bird's Neck Isthmus of New Guinea; see description of this species above). The operculum is simple (without concentric ridges) in *P. flavocylindrica* sp. nov. and the ultimate whorl is not constricted, the aperture is centered below the penultimate whorl (the aperture is shifted left in apertural view in *P. psittricha* sp. nov.). The axial ribs are much coarser and distant in *P. adelpha*, no dense delicate lamellae present between the peristomes in this species, and the ribs becoming denser and delicate at the constriction (not the case in *P. psittricha* sp. nov.).

Ecology: This species occurs in primary lowland rainforests at altitudes about 300-350 m. Specimens were observed in wet leaf litter accumulated in cavities of limestone anticlines formations.

Distribution: Raja Ampat Islands: Misool Island.

Conservation status: Least Concern, LC. Not enough data available to calculate current EOO. The maximum EOO is estimated less than 2000 km^2 taking into account the area of Misool and available habitat. Current AOO is 4 km^2. The maximum AOO estimated much higher but definitively below 500 km^2. The population size and trend are unknown. However, *Palaina psittricha* sp. nov. is locally common. There is one location. No major threats to this species have been identified. Misool Island is still very pristine and covered by primary rainforests for over 75%. Further research is required on distribution of this species as well as on its population size and trend.

Palaina (s. l.) ***quadricornis* van Benthem Jutting, 1958** (Plate 45 figs 10-14, map 17)

Holotype NMNL: Papua, Misoöl, Fakal, 0-75 m M. Lieftinck, 1948.10.07.

References: van Benthem Jutting (1958a: 295, 317); van Benthem Jutting (1963: 703).

Measurements: Holotype H = 3.8 mm, D = 2.3 mm, HW = 2.4 mm, PD = 1.5 mm. Selected paratypes (according to the original description): H = 4.9 mm, D = 2.4 mm, PD = 1.9 mm; H = 3.9 mm, D = 2.4 mm, PD = 1.4 mm; H = 3.5 mm, D = 2.4 mm, PD = 1.4 mm.

Description: Shell is large with very thick wall, yellowish, greenish, reddish or brownish, yellowish or greenish, sinistral, very obese with conical apex. Shell with 6 rather flat whorls (except the penultimate one), the $1^1/_2$ embryonic whorl is microscopically pitted. The suture is rather shallow but distinct. The penultimate whorl is slightly bulbous. The ultimate whorl is strongly constricted and slightly descending, narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly delimited by a broad shallow impression. The constriction is more or less centered in apertural view. The teleoconch is sculptured with delicate dense straight ribs. The ribs becoming coarser and more distant on the last half whorl. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are slightly oblique to the coiling axis. There are 11-12 ribs per 1 mm. Spiral striae are very delicate and dense. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double. The parietal margin of the peristome is not fully attached to the ultimate whorl. The margins of the inner peristome are not or slightly sinuous. The outer peristome is broadly discontinued parietally, developed as a broad collar beyond the inner peristome. There are four obtuse protrudings on the outer peristome - two basal, one palatal and one columellar (Plate 45 figs 10-14). All margins of the outer peristome are strongly sinuous. No specimens were available to study the internal lamellae. Operculum is unknown.

Ecology: Unknown. Misool Island is covered by primary lowland rainforests on mostly limestone soils.

Distribution: Raja Ampat Islands: Misool Island.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. The maximum EOO is estimated less than 2000 km^2 taking into account the area of Misool and available habitat. The maximum AOO is estimated below 500 km^2. The population size and trend are unknown. *P. quadricornis* was sampled from single locality about 70 years ago. It was not found again by the 2009 and 2012 Misool expeditions by the Entomological Society of Latvia. Threats






for this species are unknown. Misool Island is still very pristine and covered by primary rainforests for over 75%. Further basic research is required to clarify status of this species in the wild, understand its distribution, estimate population size and highlight threats.

Palaina (s. l.) ***repandostoma*** **van Benthem Jutting, 1963** (Plate 45 figs 15-17, map 26)

Holotype NMNL: Papua, Biak, woonkamp Marine, L.D.Brongersma.

References: van Benthem Jutting (1963: 706, pl. 29 fig. 27).

Measurements: Holotype H = 3.35 mm, D = 2.4 mm, HW = 2 mm, PD = 1.7 mm. Selected paratypic specimens (according to the original description): H = 3.2 mm, D = 2.4 mm, PD = 1.7 mm; H = 3 mm, D = 2 mm, PD = 1.5 mm.

Description: Shell is large, creamy coloured, sinistral, obese with flattened apex. Shell with 5½ strongly convex whorls, the $1^{1}/_{2}$ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is constricted and ascending, it is nearly as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well defined by a short distinct impression and a cavity-like sutural impression above the constriction. The constriction is more or less centered in apertural view. The teleoconch is sculptured with delicate dense straight ribs. The ribs becoming stronger but not much distant on the last half whorl. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are about 12 ribs per 1 mm. Spiral striae are lacking. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is shifted left against the coiling axis in apertural view. The peristome is indistinctly double, very thick and consists of numerous thin lamellae in lateral view. The parietal margin of the peristome is not fully attached to the ultimate whorl. The palatal and the columellar margins of both peristomes are slightly sinuous. The inner peristome forms a continuous polished callus, expands and covers most of the ultimate whorl. The outer peristome is broadly discontinued parietally. No specimens were available to study the internal lamellae. Operculum is unknown.

Ecology: Type specimens were sampled from leaf litter.

Distribution: Cenderawasih Bay Islands: Biak Island.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. The maximum EOO for this species is estimated 7800 km^2 taking into account the area of Biak, Supiori, Numfoor and adjacent islets. The maximum AOO estimated below the threshold of 500 km^2. This species is known from a small series of specimens sampled about 70 years ago from two close localities. Biak is widely known by high proportion of endemic malacofauna (e.g. van Benthem Jutting 1963). The population size and trend are unknown. Threats for this species are unknown. Further basic research is required to highlight status of the species in the wild, estimate the population size and highlight threats.

Palaina (s. l.) ***scaveola*** **van Benthem Jutting, 1958** (Plate 45 figs 18-20, map 16)

Holotype NMNL: Papua, Misoöl, Waima, 0-75 m, 1948.09.13 M.A. Lieftinck.

References: van Benthem Jutting (1958a: 295, 315); van Benthem Jutting (1963: 704).

Measurements: Holotype H = 2.3 mm, D = 1.3 mm, HW = 1.2 mm, PD = 1 mm. Paratypic specimen (according to the original description): H = 1.9 mm, D = 1.1 mm, PD = 0.8 mm.

Description: Shell is small, whitish, sinistral, cylindrical with flattened apex. Shell with 5¼ convex whorls, the 1 embryonic whorl is microscopically pitted. The suture is moderately deeply impressed. The ultimate whorl is constricted and slightly ascending, it is about as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well defined by a short distinct impression, is more or less centered in apertural view. The teleoconch is sculptured with delicate very widely-spaced sinuous axial ribs. The ribs becoming stronger but not more distant on the last half whorl. There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those of the previous whorls and are oblique to the coiling axis. There are 7 ribs per 1 mm. Spiral striae are very delicate. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, consists of several strong lamellae in lateral view. The parietal margin of the peristome is not fully attached to the ultimate whorl. The palatal and the columellar margins of both peristomes are strongly sinuous. The inner peristome forms a continuous polished callus, expands and covers most of the ultimate whorl. The






outer peristome is broadly discontinued parietally, with two obtuse protrudings near the palatal / parietal and the parietal / columellar junctions (Plate 45 figs 18-19). No specimens were available to study the internal lamellae. Operculum is unknown.
Ecology: Unknown. Misool Island is covered by primary lowland rainforests on mostly limestone soils.
Distribution: Raja Ampat Islands: Misool Island.
Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. The maximum EOO estimated below 2000 km^2 taking into account the area of Misool and available habitat. The maximum AOO estimated below 500 km^2. The population size and trend are unknown. *P. scaveola* seems uncommon and was not found by the 2009 and 2012 expeditions of the Entomological Society of Latvia to Misool. This species is known from two localities in lowland rainforests on limestone soils. Threats for this species are unknown. Misool Island is still very pristine and covered by primary rainforests for over 75%. Further basic research is required on distribution of *P. scaveola*, its population size, trend as well as on threats.

Palaina (s. l.) ***schneideri* I. et B. Rensch, 1929**
(Plate 45 figs 21-24, map 28)

Lectotype MHUB [herewith designated]: Zoolog. Museum Berlin [printed] 90936 Palaina schneideri I.+B. Rensch * Neu-Pommern Weite Bucht Karlei lg. P. Schneider [handwritten] / Zoolog. Museum Berlin. Typus von: [printed] Palaina schneideri I. + B.Rensch Zool. Anz. 80, 1929, p. 85, Abb. 5 [sic! Fig. 6] [handwritten] [label red]. Paralectotype 1 adult MHUB [herewith designated]: same labels as lectotype.

Lectotype designation: Lectotype was selected from two syntypes, all with same labels.
References: Rensch I. & B. (1929: 85); Rensch I. (1937: 604).
Measurements: Lectotype H = 3.1 mm, D = 1.6 mm, HW = 1.5 mm, PD = 1.3 mm. Paralectotype H = 3.1 mm, D = 1.6 mm, HW = 1.45 mm, PD = 1.2 mm. According to Rensch I. (1937), smallest specimen has shell H about 2 mm.
Description: Shell is large, whitish, sinistral, high cylindrical with conical apex. Shell with 6 strongly convex whorls, the $1^1/_2$ embryonic whorl is microscopically pitted. The suture is moderately deeply impressed. The ultimate whorl is strongly constricted, narrower than the penultimate whorl in apertural view. The tuba is prolonged (protruding from shell outline) and funnel-like widened (Plate 45 fig. 24). The umbilicus is closed in adult. The constriction is poorly defined by a short zone of stronger distant axial ribs. The constriction is more or less centered in apertural view. The teleoconch is sculptured with delicate straight or slightly sinuous axial ribs. The ribs are widely-spaced on early whorls and the ultimate whorl, but very dense on the penultimate whorl. The ribs becoming much stronger but not much distant on the last half whorl. There are abrupt changes in the ribbing pattern - see above. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are about 22-24 ribs per 1 mm, but ~10-12 ribs on the apertural side of the ultimate whorl. Spiral striae are lacking. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is indistinctly double, very thick and consists of numerous delicate lamellae in lateral view. The parietal margin of the peristome is not fully attached to the ultimate whorl. The inner peristome forms a continuous polished callus. The outer peristome is discontinued parietally. The palatal margins of both peristomes are slightly sinuous. No specimens were available to study the internal lamellae. Operculum is unknown.
Ecology: Type specimens found in riverine lowland rainforest.
Distribution: Bismarck Archipelago: New Britain Island.
Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. The maximum EOO for this species estimated 145000 km^2 taking into account the area of New Britain, New Ireland and adjacent islets. The maximum AOO estimated below the threshold of 500 km^2. This species is known from a series of nearly 100 years old specimens. The population size and trend are unknown (however, Rensch I. (1937) stated this species was found in large series). Threats for this species are unknown. Further research is required to clarify status of this species in the wild, calculate population size and highlight threats.

Palaina (s. l.) ***silvicultrix* sp. nov.** (Figs 87 & 115, plate 46 figs 1-3, map 20)
http://zoobank.org/57EF6421-9257-4982-93B8-8A1DD1FC87EA
Holotype LKCNHM: Indonesia: West Papua [sic!], Waigeo, Lopintol, Gua Kalepale, Leg. T. Whitten, Jan. 2013.
Paratypes 79 adults LKCNHM & 6 adults KGC: same label as holotype.

Derivatio nominis: Named from Latin “silvicul-






trix" [living in woods, forest dweller].
Measurements: Holotype H = 2.6 mm, D = 1.4 mm, HW = 1.5 mm, PD = 1.15 mm; Selected paratypic specimens: H = 2.6 mm, D = 1.3 mm, HW = 1.4mm, PD = 1.1 mm; H = 2.6 mm, D = 1.4 mm, HW = 1.5 mm, PD = 1.3 mm; H = 2.6 mm, D = 1.4 mm, HW = 1.45 mm, PD = 1.3 mm.
Description: Shell is small, whitish, sinistral, cylindrical, with broadly conical apex. Shell with 6 convex whorls, the 1¾ embryonic whorl is microgranulate. The suture is rather deeply impressed. The ultimate whorl is constricted and somewhat descending, it is as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The protoconch is placed oblique on the rest of the shell. The constriction is poorly delimited by a broad and shallow impression and a zone of delicate axial ribs. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse widely-spaced straight ribs. The ribs becoming coarser (significantly higher) and more distant on the ultimate whorl. The ribbing pattern is flat and delicate around and in the constriction. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are 7 ribs per 0.5 mm. Spiral striae are lacking at x500 magnification. The aperture is not or slightly tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is double, very thin in lateral view. The columellar margin of the outer peristome is somewhat angulate (Plate 46 fig. 1). The inner peristome forms a broad continuous polished callus. The columella is rather broad and shiny. Operculum is unknown.
Differential diagnosis: No congeners with similarly shaped and ribbed shells are known from the study region. *P. granulum* I. et B. Rensch, 1929 (New Britain Island) is somewhat similar but this species differs specifically in more slender shell shape, strongly denser and less high axial ribs.
Ecology: Unknown.
Distribution: Raja Ampat Islands: Waigeo Island. Co-ordinates of Gua [cave] Kalepale are 00°17'18"S, 130°49'15"E, but no information is available where exactly these specimens were sampled.
Conservation status: Data Deficient, DD. This species is known from large series of specimens collected under unknown circumstances and the habitat of species is unknown. No information is available to calculate current EOO. The maximum EOO is estimated no less than 65 km^2 taking into account Lopintol and adjacent area of West Waigeo. The current AOO is 4 km^2, the maximum AOO is certainly under 500 km^2. Threats are unknown. The population size and trend are unknown. Further research is required primarily to highlight distribution and habitat requirements of *P. silvicultrix* sp. nov. and calculate its population size.

Palaina (s. l.) ***slapcinskyi* sp. nov.** (Fig. 88, plate 46 figs 4-11, map 26)
http://zoobank.org/7C67D357-17E1-4991-8854-8B53FD83FB66
Holotype UF (No 507372): UF 380639 Mollusca, Diplommatinidae 24 specimen(s) *Palaina* [printed] sp. 8 [handwritten] Papua New Guinea, Sandaun Province Smanmoke, base of S slope of Mount Sapau, 4 km NW of Parkop Village mature hill forest along river 561 meters -3.3926° 142.5298° Slapcinsky, J. 24 Mar 2005 JS-0800 dry FLORIDA MUSEUM OF NATURAL HISTORY [printed] / JS 800 Palaina? [handwritten].
Paratypes 58 specimens: 10 adults, 1 subadult, 16 juv. UF & 3 adults KGC: same labels as holotype [2 adults are badly broken]; 2 adults & 11 juv. UF: UF 380587 Mollusca, Diplommatinidae 12 specimen(s) *Palaina* [printed] sp. 8 [handwritten] Papua New Guinea, Sandaun Province Wayayane, 1 km N of Parkop Village, 4 km NW of Sibilanga Mission hill forest 564 meters -3.4194° 142.5269° Slapcinsky, J. 16 May 2005 JS-0794 dry FLORIDA MUSEUM OF NATURAL HISTORY [printed] / Palaina JS-794 [handwritten]; 10 adults & 1 juv. UF, 1 adult KGC: UF 380655 Mollusca, Diplommatinidae 13-spec. *Palaina* Papua New Guinea, Sandaun Province Wayayane, 1 km N of Parkop Village, 4 km NW of Sibilanga Mission hill forest 564 meters -3.4194° 142.5269° Slapcinsky, J. 16 May 2005, JS-0794 75% ethanol FLORIDA MUSEUM OF NATURAL HISTORY [printed] / JDS-794 [handwritten]; 2 adults & 1 subadult UF: UF 380673 Mollusca, Diplommatinidae 3-spec. *Palaina* Papua New Guinea, Sandaun Province Sinberien, base of S slope of Mount Sapau, 4 km NW of Parkop Village, 7 km NW of Sibilanga Mission wet hill forest along alkaline stream 526 meters -3.3975° 142.5288° Slapcinsky, J. 22 May 2005, JDS-0798 75% ethanol FLORIDA MUSEUM OF NATURAL HISTORY [printed] / 798 [handwritten] [shells strongly dissolved]; 5 adults, 1 subadult & 7 juv. UF: UF 380572 Mollusca, Diplommatinidae 14 specimen(s) *Palaina* [printed] sp. 8 [handwritten] Papua New Guinea, Sandaun Province Sinberien, base of S slope of Mount Sapau, 4 km NW of Parkop Village, 7 km NW of Sibilanga Mission wet hill forest along alkaline stream 526 meters -3.3975° 142.5288° Slapcinsky, J. 22 May 2005 JS-0798 dry FLORIDA MUSEUM OF NATURAL HISTORY [printed] / JS-798 [handwritten]; 1 adult UF: UF 380732 Mollusca, Diplommatinidae 1-spec. *Palaina* Papua New Guinea, Sandaun Province Ataukbumbu, base of S slope of Mount Sapau, 4 km NW of Parkop Village, 7 km NW of Sibilanga Mission hill forest 550 meters -3.3934°






142.5318° Slapcinsky, J. 27 May 2005, JS-0806 75% ethanol FLORIDA MUSEUM OF NATURAL HISTORY [printed] / JS 806 [handwritten].

Derivatio nominis: Patronymic. This species is named after its first collector, famous malacologist and specialist on Papuan malacofauna, my dear colleague John Slapcinsky (UF).
Measurements: Holotype H = 2 mm, D = 1.1 mm, HW = 1 mm, PD = 0.8 mm. Selected paratypic specimens: H = 2.05 mm, D = 1.2 mm, HW = 1.1 mm, PD = 0.8 mm; H = 2 mm, D = 1.2 mm, HW = 1.05 mm, PD = 0.8 mm; H = 2 mm, D = 1.1 mm, HW = 1.1 mm, PD = 0.8 mm; H = 1.95 mm, D = 1.1 mm, HW = 1.1 mm, PD = 0.8 mm; H = 1.9 mm, D = 1.1 mm, HW = 1 mm, PD = 0.75 mm; H = 1.8 mm, D = 1 mm, HW = 1 mm, PD = 0.8 mm.
Description: Shell is small, whitish or yellowish, sinistral, narrow cylindrical with rounded apex. Shell with $5^{1}/_{3}$ convex whorls, the $1^{1}/_{3}$ embryonic of them are microgranulate. The suture is rather deeply impressed. The ultimate whorl is strongly constricted and descending, it is as wide as the penultimate whorl in apertural view. The umbilicus is extremely narrowly open in adult, not perspective. The constriction is poorly defined by a short shallow impression and a short zone of dense axial ribs. The constriction is more or less centered in apertural view. The teleoconch whorls sculptured with coarse distant straight ribs. The ribs becoming even more widely spaced on the last half whorl. There are abrupt changes in the ribbing pattern at the constriction (see above). The ribs are not synchronized with those on previous whorls and are straight to the coiling axis. There are 5 ribs per 0.5 mm. Spiral striae are delicate and very dense. The aperture is not tilted from the coiling axis, is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is double, Peristomal margins are not sinuous. The inner peristome forms a polished callus which is discontinued parietally. The outer peristome is somewhat expanding beyond the inner one. The columella is smooth, very broad in upper half, narrowed towards base and provided with a flat median glass-like semitransparent callus which is directed backwards. The operculum is derivative - circular, shortly tubular with concentric peripheral growth ridges and medially hollow on the outer surface.
Differential diagnosis: This species is peculiar due to the combination of the following characters: the operculum is tubular with peripheral growth ridges, shell small with distant and coarse axial ribs, the aperture is centered below the ultimate whorls and the umbilicus is very narrowly open.
Ecology: Specimens were sampled at altitudes 526-564 m in primary lowland rainforest on limestone, along streams and river.
Distribution: Northern New Guinea: Torricelli Mountains.
Conservation status: Least Concern, LC. The current EOO is about 20 km^2, but the maximum EOO is definitely much larger and may include large part of Torricelli Mountains. The current AOO is 8 km^2, the maximum AOO estimated below the threshold of 500 km^2. The population size and trend are unknown, but *P. slapcinskyi* sp. nov. seems not uncommon. Main threat for this species is unknown. Torricelli Mountains are still very pristine and covered with primary rainforests for over 80%. According to the data from Global Forest Watch (2016), no large or mid-scale deforestation reported from the area of occurrence of *P. slapcinskyi* sp. nov. I cannot project any significant changes in extent or quality of habitat for this species for the next 10 years. Further basic research is required on distribution, population size and threats for this species.

Palaina (s. l.) ***solomonensis*** **(Dell, 1955) comb. nov.** (Plate 46 figs 12-14, map 19)
Holotype MONZ: M.202515, SOLI4403, Gardner, Norman 1944, Solomon Islands Treasury Islands Mono Island, ridge above Seveke River Leaf mould.

New combination: New combination is based on conchological characters. A little denticle on the columellar side of the aperture cannot be classified as generic character of *Diplommatina* since it is not supplemented by palatalis and parietalis.
References: Dell (1955: 423, 424), as *Diplommatina solomonensis*.
Measurements: Holotype H = 2.9 mm, D = 1.4 mm, HW = 1.4 mm, PD = 1.15 mm.
Description: Shell is small, pale rose with darker embryonic whorls, sinistral, narrow and high conical with convex apex. Shell with 6½ convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is rather deeply impressed. The ultimate whorl is slightly constricted, as wide as the penultimate whorl in apertural view. The constriction is poorly defined by a short and shallow impression and a short zone of stronger sinuous axial ribs. The constriction is more or less centered in apertural view. The teleoconch is sculptured with coarse widely-spaced (particularly distant on early whorls and on the last half whorl), straight (on




central whorls) to slightly sinuous (on the apertural side of the ultimate whorl) axial ribs. The ribs becoming denser on the apertural side of the penultimate whorl. There are no abrupt changes in the ribbing pattern. The ribs are partially synchronized with those of the previous whorls and are slightly oblique to the coiling axis. There are about 15 ribs per 1 mm. Spiral striae are very delicate. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The parietal margin of the peristome is attached to the ultimate whorl. The peristome is double, very broad, consists of numerous dense lamellae in lateral view. The inner peristome forms a broad continuous polished callus. The palatal margins of both peristomes are sinuous. The columellar denticle is inconspicuous, not directed downwards. No specimens were available to study the internal lamellae (but there no palatalis or parietalis are visible through shell wall). Operculum is unknown.

Ecology: Specimens were sampled from leaf litter in lowland rainforest.

Distribution: Solomon Islands: Mono Island.

Conservation status: Data Deficient, DD. This species is known from a few historical specimens collected more than 50 years ago from one locality. The population size and trend are unknown. Threats are unknown. Further research is required.

Palaina (s. l.) ***sparselamellata*** **sp. nov.** (Fig. 89, plate 46 figs 12-19, map 21)

http://zoobank.org/B36F0D4E-F5C8-41DC-9C6E-D23CCCB23A84

Holotype NME: INDONESIA E, Raja Ampat, Waigeo Island, Waisai 10-13 km NE, 00°21'17"S, 130°54'37"E, ~70 m, 16.II.2012, primary lowland rainforest on limestone, leg. D.Telnov.

Paratypes 3 adults KGC: same label as holotype [one adult is badly broken].

Derivatio nominis: Named from Latin "sparsus" [sparse, rare] + "lamella" to stress widely-spaced axial ribs of the shell.

Measurements: Holotype H = 2.05 mm, D = 1.2 mm, HW = 1.1 mm, PD = 0.9 mm. Selected paratypic specimens: H = 1.9 mm, D = 1.2 mm, HW = 1.1 mm, PD = 0.9 mm; H = 1.9 mm, D = 1.2 mm, HW = 1.05 mm, PD = 0.8 mm.

Description: Shell is very small to small, brown to pale brown, sinistral, broadly cylindrical with flattened apex. Shell with 5 strongly convex whorls, the 1¼-1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is slightly constricted, about as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well defined by presence of a short but deep impression, dense pattern and height reduction in axial ribs and by presence of a deep cavity-like impression on the suture above the constriction. The constriction is more or less centered in apertural view. The teleoconch is sculptured with high lamella-like and rather widely-spaced straight or slightly sinuous ribs. The ribs becoming stronger and more distant on the last half whorl. There are abrupt changes in the ribbing pattern – the ribs are much denser on early whorls and at the constriction. The ribs are not synchronized with those of the previous whorls and are slightly oblique to the coiling axis. There are 4-5 ribs per 0.5 mm. Spiral striae are lacking. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, consists of several strong lamellae in lateral view. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a continuous polished callus. The outer peristome is broadly discontinued parietally. The palatal margins of both peristomes are strongly sinuous. In fully grown specimens the parietal / palatal and the columellar / parietal junctions of the inner peristome expand in obtuse protrudings (Plate 46 figs 15 & 17). The columella is smooth, angulate medially. The operculum is derivative - with tuba-like concentric ridge on the outer surface.

Differential diagnosis: This species is distinctive due very distant ribbing pattern on the last half whorl. Similar *Palaina hartmanni* sp. nov. (Waigeo Island; see description of this species above) differs in having denser ribs on all the teleoconch whorls except for the last half whorl. The operculum in this species is with low ridge and its shell is generally smaller than in *P. sparselamellata* sp. nov.

Ecology: Specimens sampled from undersides of wet fallen leaves in primary lowland rainforest on limestone (karst area).

Distribution: Raja Ampat Islands: Waigeo Island.

Conservation status: Data Deficient, DD. This species inhabits eastern peninsula of Waigeo, hitherto recorded from one locality in the southern part of the island. Not enough data available to calculate current EOO. The maximum EOO estimated below 5000 km^2 (the area of Waigeo and adjacent islets plus available habitat). Current AOO is 4 km^2, but the maximum AOO estimated up to 500 km^2. The population size is unknown, but only few speci-






mens were found during the field study. Main threat for this species is unknown. Growing human population of southern Waigeo and increasing tourism in the area (both national and international) demand more gardens, infrastructure and tourism resorts. Waigeo got a regency capital of Raja Ampat administrative province some years ago what resulted in boosting development. Waigeo is initially rich in limestone rocks and limestone is widely used for roads and buildings construction. Growing population (partly a result of immigration from other islands of Indonesia) requires more firewood and charcoal. Aforementioned facts are not yet reported from the eastern peninsula and currently there are no villages nearby the type locality of *P. sparselamellata* sp. nov. However, decline in primary lowland rainforests is projected also for this area, but definitively not for the next 10 years. Specimens of *P. sparselamellata* sp. nov. were not observed in disturbed forests. Additional research is required on distribution and ecological preferences of this species, its population size and trend.

Palaina (s. l.) ***tanimbarensis*** **sp. nov.** (Fig. 90, plate 46 figs 20-22, map 15)
http://zoobank.org/9C92C798-164A-409C-AD50-EF2A6CF1F7E3

Holotype NMNL: Coll. J.J. Vermeulen, nr. 4728 Palaina indet. - Diplommatinidae 1995.06. INDONESIA. Tanimbar Islands; W part Yamdena Isl., near Kpg. Makatian. Undisturbed primary forest on limestone, near riverbed, 4-6 km from the sea (3-5 km from a brackish river). Leg. A.J. Whitten, 00/10/1995.
Paratypes 2 adults NMNL: same label as holotype.

Derivatio nominis: Toponymic. This species named after the Tanimbar Islands, its area of occurrence.
Measurements: Holotype H = 3.2 mm, D = 2.3 mm, HW = 2 mm, PD = 1.8 mm (1.2 mm without expansion of the outer peristome). Paratypic specimens: H = 3.25 mm, D = 2.1 mm, HW = 2.1 mm, PD = 1.5 mm (1.15 mm without expansion of the outer peristome); H = 3.2 mm, D = 2.25 mm, HW = 2.05 mm, PD = 1.8 mm (1.1 mm without expansion of the outer peristome).
Description: Shell is large, creamy coloured, sinistral, cylindrical with flattened apex. Shell with 6 convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is slightly constricted, it is as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well defined by a zone of low dense axial ribs. The constriction is more or less centered in apertural view. The early 1½-3¼ teleoconch whorls covered with rather dense straight axial ribs. The ribs becoming very widely-spaced on the teleoconch whorls 3¼-6. The ribs are elevated and somewhat c-like bent on the periphery of each whorl, forming low lamella-like protrudings (Plate 90 figs 20-22). The ribs becoming even more distant on the last half whorl. There are abrupt changes in the ribbing pattern (see above). The ribs are not synchronized with those of the previous whorls. The ribs are oblique to the coiling axis. There are 2-3 c-like bent ribs per 1 mm. Spiral striae are very delicate and dense. The aperture is not tilted to the coiling axis, is oval and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, thin in lateral view. The parietal margin of the peristome is attached to the ultimate whorl. The outer peristome is broadly discontinued parietally. The outer peristome expands very strongly, wing-like beyond the inner peristome on the palatal, basal and columellar sides. Both the palatal and columellar margins of the outer peristome are slightly sinuous. The columella is thin and slightly curved, provided with a small prebasal fold. Operculum is unknown.
Differential diagnosis: This species is different from its sympatric congener *Palaina thomasrinteleni* sp. nov. (Yamdena Island; see description of this species below) by its sinistral and cylindrical shell (shell is conical, slender and dextral in *P. thomasrinteleni* sp. nov.), presence of complete high c-like bent axial ribs (axial ribs are incomplete and not lamella-like, either ɔ-like bent in *P. thomasrinteleni* sp. nov.). *Palaina tanimbarensis* sp. nov. differs from another close sympatric congener *P. mirifica* sp. nov. (Yamdena Island; see description of this species above) by higher and less obese shell, bent axial ribs (ribs are straight in *P. mirifica* sp. nov.) and less stronger expanded outer peristome.
Ecology: Specimens found in primary riverine lowland rainforest on limestone soil.
Distribution: Tanimbar Islands: Yamdena Island.
Conservation status: Data Deficient, DD. This species is currently known from a few individuals. Its habitat, population size and threats are unknown. Further basic research is required.

Palaina (s. l.) ***telnovi*** **sp. nov.** (Fig. 91, plate 46 figs 23-26, map 21)
http://zoobank.org/AF115575-6E0F-4DB5-A0D8-0208B97288A9

Holotype NME: INDONESIA E, Raja Ampat, Waigeo Island, Waisai 3 km W, 00°26'04"S, 130°47'41"E, 40-





50 m, 17.II.2012, secondary lowland rainforest on limestone, leg. D.Telnov.
Paratypes 22 specimens: 1 adult KGC: same label as holotype; 7 adults NME, 10 adults & 4 juv. KGC: INDONESIA E, Raja Ampat, Waigeo Island, Waisai 4,5 km SW, Waiwo dive resort, 00°26'07"S, 130°46'45"E, 10-15 m, 21.II.2012, primary lowland rainforest on limestone, leg. D.Telnov.

Derivatio nominis: Patronymic. This species is devoted to its first collector, famous entomologist, biogeographist and New Guinea explorer Dr. Dmitry Telnov (The Entomological Society of Latvia, Rīga).
Measurements: Holotype H = 2.7 mm, D = 1.75 mm, HW = 1.4 mm, PD = 1.3 mm. Selected paratypic specimens: H = 3 mm, D = 1.9 mm, HW = 1.5 mm, PD = 1.35 mm; H = 2.95 mm, D = 1.8 mm, HW = 1.4 mm, PD = 1.4 mm; H = 2.9 mm, D = 1.75 mm, HW = 1.4 mm, PD = 1.3 mm; H = 2.9 mm, D = 1.75 mm, HW = 1.4 mm, PD = 1.35 mm; H = 2.6 mm, D = 1.7 mm, HW = 1.25 mm, PD = 1.3 mm.
Description: Shell is small, pale brown, dextral, obese with flattened apex. Shell with 5¾ convex whorls, the 1½ embryonic whorl is microscopically pitted. The protoconch is placed oblique on the rest of the shell. The suture is deeply impressed. The ultimate whorl is constricted, slightly wider than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well defined by presence of a broad shallow impression, much denser and delicate axial ribs and a cavity-like impression of the suture above the constriction. The constriction is more or less centered in apertural view. There is a strong bulb just beyond the constriction above the columellar side of the aperture. The teleoconch is sculptured with coarse widely-spaced inconspicuously sinuous ribs. There are abrupt changes in the ribbing pattern – the ribs becoming 3x more distant beyond the constriction. The ribs are partially synchronized with those of the previous whorls and are oblique to the coiling axis. There are 8-10 ribs per 1 mm. Spiral striae are not visible at 80x magnification. The aperture is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is distinctly double. The parietal margin of the peristome is attached to the ultimate whorl. The palatal margins of both peristomes are slightly sinuous. The inner peristome forms a continuous polished callus. The columella is smooth, provided with a very large triangular knob in its upper half. This knob is directed backwards. The operculum is derivative - circular and concave, with a single peripheral ridge on the outer surface.
Differential diagnosis: This species is distinctive primarily due to its coarse and distant axial ribs and presence of a large backward directed knob on the columella.
Ecology: This species found in secondary lowland rainforests on limestone soil about 10-50 m altitude. Specimens were collected from under of large fallen leaves.
Distribution: Raja Ampat Islands: Waigeo Island.
Conservation status: Endangered, EN B1B2ab(iii,iv). This species inhabits western peninsula of Waigeo, hitherto recorded from two localities in the southern part of it. Not enough data available to calculate current EOO. The maximum EOO estimated below 5000 km^2 (the area of Waigeo and adjacent islets plus available habitat). The current AOO is 8 km^2, but the maximum AOO estimated below 500 km^2 (taking into account available habitat). The population size is unknown, but this species is not uncommon locally. Habitat loss and alteration are the main threats. Rainforests are converted to gardens, timber collecting and small-scale logging take place. Growing human population of southern Waigeo and increasing tourism in the area (both national and international) demand more gardens, infrastructure and tourism resorts. Waigeo got a regency capital of Raja Ampat administrative province of Indonesia some years ago, which resulted in boosting development. Waigeo is initially rich in limestone rocks and this raw material is widely used for roads and buildings construction. Growing population (partly a result of immigration from other islands of Indonesia) requires more firewood and charcoal. Aforementioned factors result in slow decline in primary lowland rainforests cover, especially in SW part of Waigeo. This trend is observed, projected and likely to continue resulting in decline of the AOO. Specimens of *P. telnovi* sp. nov. were observed also in disturbed forests with closed canopy (wet litter is the key). Between 2001-2014 south-western Waigeo lost just about 1100 ha of the rainforest (calculated for canopy density over 25% according to the Global Forest Watch (2016)), but almost exactly in the area where *P. telnovi* sp. nov. occurs. Additional research is required on distribution of this species and its population size. It seems important to clarify if *P. telnovi* sp. nov. is distributed all over Waigeo or is limited to southern part of it.

Palaina (s. l.) ***thomasrinteleni*** **sp. nov.** (Fig. 92, plate 47 figs 1-4, map 15)
http://zoobank.org/D9484389-414E-42E0-B15D-668C37D09980






Holotype NMNL: Coll. J.J. Vermeulen, nr. 4725 Palaina indet. - Diplommatinidae 1995.06. INDONESIA. Tanimbar Islands; W part Yamdena Isl., near Kpg. Makatian. Undisturbed primary forest on limestone, near riverbed, 4-6 km from the sea (3-5 km from a brackish river). Leg. A.J. Whitten, 00/10/1995.
Paratypes 2 adults & 1 juv. NMNL: same label as holotype [one adult is broken].

Derivatio nominis: Patronymic. This species is devoted to Dr. Thomas von Rintelen (MHUB), my good friend and famous specialist on evolution and taxonomy of the Indo-Australian freshwater gastropods.
Measurements: Holotype H = 3.3 mm, D = 1.8 mm, HW = 1.6 mm, PD = 1.3 mm. Paratypic specimens: H = 3.2 mm, D = 1.9 mm, HW = 1.6 mm, PD = 1.4 mm; H = 3 mm, D = 1.8 mm, HW = 1.5 mm, PD = 1.05 mm.
Description: Shell is large, creamy coloured, dextral, conical with conical apex. Shell with 6 convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is constricted, as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined by presence of a very shallow impression and denser and lower pattern of axial ribs. The constriction is more or less centered in apertural view. The teleoconch is sculptured with delicate low and very widely-spaced ribs. The ribs are slightly elevated and strongly ↄ-like bent at the periphery of each whorl and therefore form low, lamella-like protrudings (in juvenile shells the ribs are developed into long spine-like folded protrudings (Plate 47 fig. 4)). They fall off when the shell is growing and only low basements remain visible on adult shells (Plate 47, figs 1-3)). The ribs are incomplete on most of the teleoconch (Plate 47, figs 1-3). The ribs are only complete (upper parts of the ribs is present) on the last half whorl where they becoming lower and less strongly bend. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are 3 bent ribs per 1 mm. Rather dense axial striation is present between the ribs. At the constriction the ribs are straight (not bend) and dense. Spiral striae are lacking. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, very thin in lateral view. The parietal margin of the peristome is attached to the ultimate whorl. The inner peristome forms a narrow continuous polished callus. The parietal and the columellar margins of the outer peristome are sinuous. The columella is very broad. Operculum is unknown.
Differential diagnosis: This species is distinctive among all other congeners due to the combination of the following characters: shell dextral with peculiar very widely-spaced ↄ-like bent axial ribs. Its sympatric congener *P. tanimbarensis* sp. nov. (Yamdena Island; see description of this species above) is different in sinistral broadly cylindrical shell and the higher, c-like bent axial ribs.
Ecology: Specimens found in primary riverine lowland rainforest on limestone soil.
Distribution: Tanimbar Islands: Yamdena Island.
Conservation status: Data Deficient, DD. This species is known from small series of individuals. Its habitat, population size and threats are unknown. Further basic research is required.

Palaina (s. l.) ***vermeuleni* sp. nov.** (Fig. 93, plate 47 figs 5-7, map 15)
http://zoobank.org/0800C397-F08F-4316-966A-5CFB3920DAA1
Holotype NMNL: Coll. J.J. Vermeulen, nr. 4170 Arinia dohertyi (E.A. Smith 1897) Diplommatinidae INDONESIA. Aru Islands, Pulau Kobroor, near Jerlai. Dry river bed over limestone soil. Leg. M. v. Balgooij, 29/04/1993.
Paratypes 2 adults NMNL: same label as holotype [one adult is badly broken].

Derivatio nominis: Patronymic. This species is devoted to Dr. Jaap Jan Vermeulen (NMNL), an authority in Oriental terrestrial molluscs who provided me with this new material.
Measurements: Holotype H = 3.9 mm, D = 2.3 mm, HW = 2.3 mm, PD = 1.9 mm. Selected paratypic specimen H = 3.7 mm, D = 2.4 mm, HW = 2.1 mm, PD = 1.7 mm.
Description: Shell is large, whitish to creamy coloured, dextral, cylindrical with conical apex. Shell with 6 convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is deeply impressed. There is a rather strong bulb just beyond the constriction above the columellar side of the aperture. The ultimate whorl is slightly constricted, hardly narrower than the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is well defined by presence of a broad flat impression, a zone of more distant axial ribs and a cavity-like impression on the suture above the constriction. The constriction is more or less centered in apertural view. The teleoconch is sculptured with delicate dense straight ribs. There are abrupt changes in the ribbing pattern – the ribs becoming





very inconspicuous, almost disappear at the constriction area, but beyond the constriction reappear again and becoming coarser and 3-4x sparser than on the previous whorl. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are about 17-20 ribs per 1 mm. Spiral striae are lacking. The aperture is not tilted to the coiling axis, is oval and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is simple, developed in a very broad continuous callus. Numerous very dense lamellae on the ultimate whorl prior to the peristome. The parietal side of the peristome is pressed against the parietal wall. The margins of the peristome are not or slightly sinuous. The columella is simple, with an obtuse median angulation. Operculum is unknown.
Differential diagnosis: This species belongs to a group of *Palaina* with a distinct bulb on the ultimate whorl just beyond the constriction. Compared with similar congeners, *P. vermeuleni* sp. nov. has an ordinary peristome (the peristome is very thick in lateral view in *P. polystoma* B. Rensch, 1931 and in *P. chrysostoma* E.A. Smith, 1897, both from Flores Island). The aperture is without columellar callus and there is no knob on columella in *P. vermeuleni* sp. nov. (flat but distinct basal knob present in *P. chrysostoma*). There are about 17-20 ribs per 1 mm on the penultimate whorl in *P. vermeuleni* sp. nov., its shell is stronger conical (in *P. novoguineensis* E.A. Smith, 1897 from W New Guinea and Misool, shell is more obese and there are about 10-13 ribs per 1 mm on the penultimate whorl). Generally, more material is necessary to highlight another differences between *P. vermeuleni* sp. nov. and *P. novoguineensis*.
Ecology: Specimens found in riverine lowland rainforest on limestone soil.
Distribution: Aru Islands: Kobroor Island.
Conservation status: Data Deficient, DD. This species is known from the small series of individuals. Its habitat, population size and threats are unknown. Further basic research is required.

Palaina (s. l.) ***waigeo* sp. nov.** (Figs 94-95, 103 & 143, plate 47 figs 8-13, map 21)
http://zoobank.org/6E047643-16FF-4F8D-9137-5F01C5DA3137
Holotype NME: INDONESIA E, Raja Ampat, Waigeo Island, Waisai 3 km W, 00°26'04"S, 130°47'41"E, 40-50 m, 17.II.2012, secondary lowland rainforest on limestone, leg. D.Telnov.
Paratypes 3 specimens: 1 adult KGC: same label as holotype; 1 adult KGC: INDONESIA E, Raja Ampat Prov., Wayag Island, along the southern coast, 31.X.2011, leaf debris in forest at the foot of limestone cliff, leg. L.Wagner; 1 adult KGC: INDONESIA E, Raja Ampat, Waigeo Island, Waisai 4,5 km SW, Waiwo dive resort, 00°26'07"S, 130°46'45"E, 10-15 m, 21.II.2012, primary lowland rainforest on limestone, leg. D.Telnov.

Derivatio nominis: This species is named after Waigeo Island, its main area of occurrence. Noun in apposition, invariable.
Measurements: Holotype H = 1.3 mm, D = 0.7 mm, HW = 0.7 mm, PD = 0.55 mm. Paratypic specimens from Waigeo: H = 1.35 mm, D = 0.7 mm, HW = 0.7 mm, PD = 0.5 mm; H = 1.3 mm, D = 0.7 mm, HW = 0.7 mm, PD = 0.5 mm.
Description: Shell is very small, yellowish, sinistral, cylindrical with flattened apex. Shell with 5½ convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is rather deeply impressed. The ultimate whorl is constricted, nearly as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. Suture is slightly impressed above the constriction (additionally, in one paratype the constriction area is free of axial ribs). The constriction situated on same axis with the columellar side of the aperture. The teleoconch is sculptured with dense delicate straight (in paratypes) or sinuous (in holotype) axial ribs. There are abrupt changes in the ribbing pattern - starting from the constriction the ribs becoming coarser and twice more distant. The ribs are not synchronized with those of the previous whorls and are slightly oblique to the coiling axis. There are about 17-19 ribs per 0.5 mm. Spiral striae are extremely delicate and dense, poorly indicated at 80x magnification (5-6 rows of spiral striae per 30 µm measured on the ultimate whorl above the aperture). The aperture is not tilted against the coiling axis, is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is distinctly double. Few inconspicuous flat lamellae present between the peristomes in lateral view. The outer peristome is stronger than the inner one. The parietal margin of the peristome is attached to the ultimate whorl. Peristomal margins are not sinuous or the outer peristome is slightly sinuous palatally. The inner peristome forms a continuous polished callus. The outer peristome is broadly discontinued parietally, somewhat reflexed. The columella is rather broad and smooth. The operculum is primitive - circular and without concentric lines of ridges.
Differential diagnosis: This species is similar to several minute Papuan *Palaina* species (consider characters discussed in table 17, see next page).






Ecology: This species occurs in secondary and, supposedly, also in primary lowland rainforests on limestone soils.
Distribution: Raja Ampat Islands: Waigeo Island, Wayag Island.
Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO. The current AOO is 12 km^2 but the maximum AOO is likely much higher. *Palaina waigeo* sp. nov. is known from three localities; all localities are not far from the seashore. Threats for this species are unknown. Waigeo Island as well as Wayag are still very pristine and covered by primary rainforests for over 75%, but local development is ongoing exactly in coastal areas where this species was found (e.g. road construction; Waisai new airport located ~3-4.5 km from two of *P. waigeo* sp. nov. localities). Further research is required on distribution of this species as well as on its population size and threats.

Table 17. Papuan species of *Palaina* s. l. similar to *P. waigeo* sp. nov. and their distinctive characters.

Species	**Character**	**Character in *P. waigeo* sp. nov.**
Palaina albrechti sp. nov.	axial ribbing pattern changes evenly starting from the constriction	there are abrupt changes in the axial ribbing pattern - starting from the constriction ribs becoming coarser and 2x more distant
P. biroi	the operculum with low concentric ridges and shallow median impression on the outer surface	the operculum without concentric ridges and without median impression
Palaina flavocylindrica sp. nov.	9-10 rows of spiral striae per 30 µm (measured above the aperture), H = 1.55-1.7 mm	5-6 rows of spiral striae per 30 µm (measured above the aperture), H = 1.3 mm
P. iha sp. nov.	axial ribbing pattern changes evenly starting from the constriction	there are abrupt changes in the axial ribbing pattern - starting from the constriction ribs becoming coarser and 2x more distant
P. insulana sp. nov.	H = 1.8-1.95 mm, the peristome rather broad (in lateral view) and consists of numerous dense lamellae, the outer peristome not or slightly stronger than inner one	H = 1.3 mm, few flat lamellae between the inner and the outer peristomes, the peristome not broad (in lateral view), the outer peristome is stronger than the inner one
P. lengguru sp. nov.	shell generally lower, W = 4¾-5, axial ribs more widely-spaced and more oblique to the coiling axis, the outer peristome is less strongly expanding, the columella widening basally	shell generally higher, W = 5½, axial ribs denser and slightly oblique to the coiling axis, the outer peristome is comparatively stronger expanding, the columella not widening basally
P. minuscularia sp. nov.	about 25-28 ribs per 0.5 mm, the columella with basal knob, 4 rows of spiral striae per 30 µm (measured above the aperture)	about 17-20 ribs per 0.5 mm, the columella is simple, 5-6 rows of spiral striae per 30 µm (measured above the aperture)

Palaina (s. l.) ***wawiyai* sp. nov.** (Figs 96 & 116, plate 47 figs 17-19, map 20)
http://zoobank.org/D124B936-196E-4831-B439-A6F45104EA05
Holotype LKCNHM: Indonesia: West Papua [sic!], Waigeo, Lopintol, Gua Kalepale, Leg. T. Whitten, Jan 2013.
Paratypes 23 LKCNHM & 3 KGC: same label as holotype [2 paratypic shells are broken].

Derivatio nominis: Named after Wawiyai, local tribe in Lopintol, the area where this species was first collected. Noun in apposition, invariable.
Measurements: Holotype H = 3.6 mm, D = 2.15 mm, HW = 1.8 mm, PD = 1.8 mm. Selected paratypic specimens: H = 3.3 mm, D = 2.1 mm, HW = 2 mm, PD = 1.8 mm; H = 3.2 mm, D = 2.2 mm, HW = 2 mm, PD = 1.9 mm; H = 3.1 mm, D = 2.2 mm, HW = 1.9 mm, PD = 1.7 mm.
Description: Shell is large, yellowish, sinistral, cylindrical with conical apex. Shell with 6 convex whorls, the 1½ embryonic whorl is microscopically pitted. The suture is rather deeply impressed. The ultimate whorl is strongly constricted, ascending, it is nearly as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The protoconch is placed oblique on the rest of the





shell. There is a deep sutural impression above the constriction. The constriction situated on same axis with the columellar side of the aperture. There is an inconspicuous bulb just beyond the constriction (the bulb can be completely hidden under strongly expanded peristome). The teleoconch is sculptured with coarse widely-spaced straight axial ribs. There are abrupt changes in the ribbing pattern – the ribs becoming less coarse and twice denser on the last two whorls. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are 9-11 ribs per 1 mm. Spiral striae are lacking at x500 magnification, but very inconspicuous axial striation (growth lines?) present between the axial ribs. The aperture is not or slightly tilted to the coiling axis, is strongly ovoid and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, thick in lateral view. Very dense flat lamellae developed between the inner and the outer peristome. The parietal margin of the peristome is detached from the ultimate whorl (in specimens with particularly strongly developed peristome - from the penultimate whorl). The inner peristome forms a very broad continuous polished callus completely covering the penultimate whorl and (in certain specimens) also covering a part of the penultimate whorl. Two very distinct obtuse ear-like protrudings near the palatal / parietal and the parietal / columellar junctions (Plate 47 figs 17 & 19). The palatal and the columellar margins of both peristomes are strongly sinuous. The outer peristome is broadly discontinued parietally. The columella is smooth and very broad, strongly narrows in basal third. Operculum is unknown.

Differential diagnosis: This species is similar to *P. laszloi* sp. nov. (Wayag Island NW of Waigeo), but differs primarily in stronger expanded peristome, ovoid aperture (aperture is circular in *P. laszloi* sp. nov.), dense and quite delicate axial ribbing pattern of the ultimate whorl (the ribs are distant and coarse on the ultimate whorl in *P. laszloi* sp.nov.) and different columella (the median knob is present on the columella in *P. laszloi* sp.nov.). *P. laszloi* sp. nov. is also generally smaller than *P. wawiyai* sp. nov.

Ecology: Unknown.

Distribution: Raja Ampat Islands: Waigeo Island. Co-ordinates of Gua [cave] Kalepale are 00°17'18"S, 130°49'15"E, but no information is available where exactly these specimens were sampled.

Conservation status: Data Deficient, DD. This species is known from specimens collected under unknown circumstances and habitat of this species is unknown. Not enough data available to calculate current EOO. The maximum EOO estimated no less than 65 km^2 taking into account Lopintol area of West Waigeo. The current AOO is 4 km^2, the maximum AOO is certainly under 500 km^2. The population size and trend are unknown. Threats to this species are unknown. Further basic research is required.

Palaina (s. l.) ***wisemani* (Cox, 1870)** (Plate 47 figs 20-24, map 11)

Additional material: 1 adult MCZ: Mus.Comp.Zoöl., Cambridge, Mass. No. [printed] 188093 Palaina wisemani Cox Kira Kira, San Cristoval Solomon Ido. [sic!] Dec. 1929 Whitney Exp. [handwritten] Ex. A.M.N.H. Acc. 503 [printed]; 1 adult MCZ: Mus.Comp.Zoöl., Cambridge, Mass. No. [printed] 188094 Palaina wisemani Cox Santa Ana Id., Solomon Ido. [sic!] Dec. 1929 Whitney Exp. [handwritten] Ex. A.M.N.H. Acc. 503 [printed].

Note: Type specimens of this species (at the Linnean Society of New South Wales) were lost in the great fire at the Garden Palace in September of 1882 (Jude Philp, personal communication). Redescription is based on MCZ specimens from Kira Kira, Makira (= San Cristobal) Island.

References: Cox (1870: 84), as *Diplommatina wisemani*; Pfeiffer (1876: 84), as *D.*[*iplommatina*] *Wisemani*; Kobelt & von Möllendorff (1898: 152), checklist, as *Palaina* Subgen. *Palaina* s. str. *wisemani*; Kobelt (1902: 406), as *P. (P.[alaina]) wisemani*; Solem (1960: 49); Gardner (1990: 7).

Measurements: Selected specimen from MCZ: H = 2.4 mm, D = 1.1 mm, HW = 1.1 mm, PD = 0.9 mm (Gardner (1990) gave the following measurements for Kira Kira specimen: H = 1 mm, D = 0.5 mm what is definitively wrong for *P. wisemani*).

Description: Shell is very small, yellowish or pale brown, sinistral, conical with conical apex. Shell with 5¾ convex whorl, there is 1½ embryonic whorl. The suture is moderately deeply impressed. The ultimate whorl is constricted and slightly ascending, it is slightly narrower than the penultimate whorl in apertural view. The constriction is poorly defined by a shallow impression, is more or less centered in apertural view. The teleoconch is sculptured with coarse widely-spaced straight or slightly sinuous axial ribs. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are oblique to the coiling axis. There are 6 ribs per 0.5 mm. Spiral striae are lacking. The aperture is not tilted with regard to the coiling axis and is circular and has entire apertural rim. The aperture is more or less









centered below the penultimate whorl in apertural view. The peristome is simple, with a broad zone of numerous delicate lamellae prior to the peristome in lateral view. The peristome forms a very broad continuous polished callus, expands and covers over a half of the ultimate whorl in apertural view. Peristomal margins are not sinuous. The parietal margin of the peristome is not completely attached to the ultimate whorl. No specimens were available to study the internal lamellae. Operculum is unknown.

Ecology: According to the original description, this species was found on wet places in montane areas. Gardner (1990) signals specimens from leaf litter at rainforest edge. Makira Island was initially covered by primary lowland rainforest.

Distribution: Solomon Islands: Makira (= San Cristobal) Island, Owaraha (= Santa Ana) Island.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. The maximum EOO estimated at least 4000 km^2 taking into account the area of Makira and adjacent islets. The maximum AOO cannot be calculated. The population size and trend are unknown. Further basic research is required to highlight status of this species in the wild, clarify its distribution, measure the population size and uncover threats.

Palaina (s. l.) ***yamdena*** **sp. nov.** (Figs 97, 144-145, plate 43 figs 25-27, map 15)

http://zoobank.org/61FEF1D5-FA43-4FF7-A97B-352AA457E2C2

Holotype NMNL: Coll. J.J. Vermeulen, nr. 4726 Palaina indet. - Diplommatinidae 1995.06. INDONESIA. Tanimbar Islands; W part Yamdena Isl., near Kpg. Makatian. Undisturbed primary forest on limestone, near riverbed, 4-6 km from the sea (3-5 km from a brackish river). Leg. A.J. Whitten, 00/10/1995.

Paratypes: 7 adults NMNL: same label as holotype; 2 adults LKCNHM: ZRC.1999.2449 [handwritten] / Coll. J.J. Vermeulen, nr. 4726 Arinia - [printed] ZRC.199.2449 [handwritten] Diplommatinidae [printed] 2nos [handwritten] INDONESIA, Tanimbar Group, W part Yamdena Isl., nr Kpg Makatian. Undisturbed primary fst on limestone, nr riverbed, 100-150 m asl, 4-6 km from the sea (3-5 km from a brackish river. Leg. A.J. Whitten, 10/1995. [printed] / ZOOLOGICAL REFERENCE COLLECTION DEPARTMENT OF ZOOLOGY NATIONAL UNIVERSITY OF SINGAPORE [printed] Diplommatinidae ZRC.MOL.10459 Ex [handwritten] ZRC. [printed] 199.2449 [handwritten] No. Spec. [printed] 2 nos. [handwritten] Species. [printed] Arinia [handwritten] Locality [printed] Indonesia, Tanimbar Group, W. part Yamdena Island, nr. Kampong Makatian. [handwritten] Collector [printed] A.J. Whitten Date [printed] Oct. 1995 [handwritten] Det. by [printed] JJ Vermeulen, nr. 4726 [handwritten] Date [printed].

Derivatio nominis: Toponymic. This species is named after Yamdena Island where it occurs and with regard to the main local language of this island. Noun in apposition, invariable.

Measurements: Holotype H = 1.8 mm, D = 1 mm, HW = 0.95 mm, PD = 0.7 mm. Selected paratypic specimens: H = 2 mm, D = 1.0.5 mm, HW = 0.8 mm, PD = 0.8 mm; H = 1.85 mm, D = 1 mm, HW = 1.05 mm, PD = 0.7 mm; H = 1.85 mm, D = 0.95 mm, HW = 0.95 mm, PD = 0.7 mm.

Description: Shell is small, whitish on upper and yellowish on lower whorls, sinistral, cylindrical with conical apex. Shell with 5¼ convex whorls, the 1¼ embryonic whorl is microscopically pitted. The suture is deeply impressed. The ultimate whorl is constricted, nearly as wide as the penultimate whorl in apertural view. The umbilicus is closed in adult. The constriction is poorly defined since the suture is slightly impressed above it and a very shallow shell wall impression is present at the constriction. The constriction situated on same axis with the columellar side of the aperture. The teleoconch is sculptured with delicate rather dense straight ribs. The ribs becoming slightly more distant on the last half whorl. There are no abrupt changes in the ribbing pattern. The ribs are not synchronized with those of the previous whorls and are slightly oblique with regard to the coiling axis. There are about 8-10 ribs per 0.5 mm. Spiral striae are extremely delicate and dense. The aperture is not tilted to the coiling axis and is circular and has entire apertural rim. The aperture is more or less centered below the penultimate whorl in apertural view. The peristome is double, consists of a few strong lamellae in lateral view. The parietal margin of the peristome is attached to the ultimate whorl. The outer peristome is broadly discontinued parietally. Peristomal margins are not sinuous. The columella is straight and shiny. Operculum is unknown.

Differential diagnosis: *Palaina yamdena* sp. nov. is conchologically similar with several Papuan species, but is specifically different (see Table 18; next page).

Ecology: Specimens found in primary riverine lowland rainforest on limestone soil.

Distribution: Tanimbar Islands: Yamdena Island.

Conservation status: Data Deficient, DD. Not enough data available to calculate current EOO and AOO. This species is known from single locality. Its population size, trend and threats are unknown. Further basic research is required.






Table 18. Papuan species of *Palaina* s. l. similar to *P. yamdena* sp. nov. and their distinctive characters.

Species	**Character**	**Character in *P. yamdena* sp. nov.**
Palaina adelpha	axial ribs coarse, becoming coarser & higher, more distant on the ultimate whorl	axial ribs delicate, not becoming conspicuously coarser or distant on the ultimate whorl
P. albrechti sp. nov.	shell apex flattened, shell regularly cylindrical	shell apex conical, shell not regularly cylindrical
P. angulata	shell prevalently dextral (sinistral specimens known), H = 2.3 - 2.8 mm, the columella is broad with glass-like inner edge	shell sinistral. H = 1.8 - 2 mm, the columella is thin and not glass-like
P. biroi	shell cylindrical, axial ribs sinuous, becoming coarser & more distant toward the end of tuba, shell regularly cylindrical	shell either conical, axial ribs either straight, not becoming conspicuously coarser or distant on tuba, shell not regularly cylindrical
P. carbavica	the columella with a large median triangular basal knob, shell dextral	the columella is simple and thin, shell sinistral
P. citrinella	H = 3.5 mm, axial ribs high and lamella-like	H under 2.5 mm, axial ribs low & delicate
P. doberai sp. nov.	the columella with a large median triangular basal knob, the peristome is very thick in lateral view	the columella is simple and thin, the peristome is thin in lateral view
P. flavocylindrica sp. nov.	axial ribs becoming coarser & more distant toward the end tuba, 16-18 ribs per 0.5 mm on the penultimate whorl	axial ribs not becoming conspicuously coarser or distant on tuba, 8-10 ribs per 0.5 mm on the penultimate whorl
P. hartmanni sp. nov.	axial ribs very coarse and widely-spaced toward the end of tuba, the palatal margin of the inner peristome is strongly sinuous	axial ribs not conspicuously coarser or distant on tuba, the palatal margin of the inner peristome is not sinuous
P. insulana sp. nov.	axial ribs becoming coarser & more widely-spaced toward the end of tuba, ribs are denser on early teleoconch whorls than on the last two whorls, shell is cylindrical	axial ribs not becoming conspicuously coarser or distant on tuba, ribs more or less equally dense on all the teleoconch whorls, shell is conical
P. lengguru sp. nov.	axial ribs becoming coarser & more distant toward the end of tuba, 13-15 ribs per 0.5 mm on the penultimate whorl, H = 1.4 mm, shell is cylindrical	axial ribs not becoming conspicuously coarser or distant on tuba, 8-10 ribs per 0.5 mm on the penultimate whorl, H = 1.8 - 2 mm, shell is conical
P. louisiade sp. nov.	axial ribs becoming 2.5x more widely-spaced on tuba, shell about 1.8-2x higher than broad	axial ribs becoming maximum 2x more widely-spaced on tuba, shell is less slender
P. psittricha sp. nov.	axial ribs becoming coarser & more distant toward the end of tuba, the aperture is not centered to the coiling axis, the ultimate whorl is narrower than the previous in apertural view	axial ribs not becoming conspicuously coarser or distant on tuba, the aperture is centered to the coiling axis, the ultimate whorl nearly as wide as the previous in apertural view

Identification keys to the Papuan and Wallacean Diplommatinidae (Sulawesi excluded)

The original identification keys below are based only on conchological characters. In most cases comparative material is essential for proper identification of species. There are many species still awaiting description. The present keys are only valid for species described and depicted in this publication.

Key to ***Diancta***

1 The aperture is more or less distinctly shifted left against the coiling axis in apertural view. Less than 12 axial ribs per 1 mm on the penultimate whorl in apertural view 2
– In apertural view the position of the aperture is either central (Plate 19 fig. 11). About 13 axial ribs per 1 mm on the penultimate whorl in apertural view .... *D. multiplicata*
2 Penultimate whorl with upper and lower margins parallel or almost parallel in apertural view, only one whorl is strongly bulbous 3
– Penultimate whorl with upper and lower margin not parallel (divergent) in apertural view, the 5th & the 6th whorls are slightly bulbous in apertural view .... *D. halmaherica* sp. nov.






3 Internal lamellae apparatus consists of four distinct palatalis ..... *D. torta*
– Internal lamellae apparatus consists of a single distinct palatalis ..... *D. obiensis* sp. nov.
– Internal lamellae apparatus without distinct palatalis ..... *D. constricta*

Key to ***Diplommatina***

1 Shell sinistral 2
– Shell dextral 8
2 Shell high conical, first 4-5 whorls widen evenly 3
– Shell obese conical, first 4-5 whorls widen rapidly ... 4
3 W = 6, longitudinal palatalis is rather short ..... *D. maibrat* sp. nov.
– W = 7, longitudinal palatalis is long ..... *D. waigeoensis* sp. nov.
4 Palatal margin of the inner peristome is sinuous 5
– Palatal margin of the inner peristome is not sinuous (Plate 25 fig. 8) ..... *D. smithi*
5 The outer peristome is angulate, expands beyond the inner one (Plate 23, figs 20 &22) 6
– The outer peristome is circular, not or slightly expanding beyond the inner one, internal lamellae without palatalis ..... *D. javana*
6 Columellar denticle conspicuous, directed downwards 7
– Columellar denticle inconspicuous, not directed downwards (Plate 23 fig. 20) ..... *D. lombockensis*
7 Internal lamellae apparatus with one short transverse palatalis, no longitudinal palatalis present ..... *D. jonabletti* sp. nov.
– Internal lamellae apparatus with one longitudinal palatalis, no transverse palatalis present ..... *D. floresiana*
8 Axial ribs lamella-like widened at the periphery of the teleoconch whorls 9
–Axial ribs lower, not lamella-like 10
9 Axial ribs high and strongly waved, complete (not shortened) and not becoming very flat on the upper part of the teleoconch whorls, the palatalis is long ..... *D. slapcinskyi* sp. nov.
– Axial ribs less conspicuous, not waved but humped at peripheries of the teleoconch whorls, becoming flat and (almost) disappear on the upper part of the teleoconch whorls, the palatalis is shorter ..... *D. patani* sp. nov.
10 Shell is conical 11
– Shell either fusiform or cylindrical (for all decollate species use this alternative) 14
11 Shell is smaller and slender, shell H ~2.5 mm, aperture is less large, peristome is comparatively thick in lateral view, spiral striae are distinct and dense at 80x magnification 12
– Shell H ~3.4-4.2 mm, aperture is large, peristome is comparatively thin in lateral view, spiral striae generally more delicate 13
12 Internal lamellae apparatus with one transverse and one longitudinal palatalis, axial ribs are straight and regular, shell generally less high, about 12 ribs per 0.5 mm on the apertural side of the penultimate whorl ..... *D. baliana*
– Internal lamellae apparatus without transverse palatalis, axial ribs are irregular and sinuous, shell generally higher and slender, about 5-6 ribs per 0.5 mm on the apertural side of the penultimate whorl .. *D. radiiformis*
13 About 5-6 axial ribs per 1 mm on the apertural side of the penultimate whorl, 5 rows of spiral striae per 50 µm (measured on the ultimate whorl above the aperture) (Fig. 136), peristome is very thin in lateral view, indistinctly double (Plate 26 fig. 3) ..... *D. symmetrica*
– About 8-10 axial ribs per 1 mm on the apertural side of the penultimate whorl, 5 rows of spiral striae per 50 µm (measured on the ultimate whorl above the aperture) (Figs 132-135), peristome is very thin in lateral view but clearly double with both the inner and outer peristome almost equally developed (Plate 26 figs 8, 11 & 14) ..... *D. telnovi* sp. nov.
– About 10-11 axial ribs per 1 mm on the penultimate whorl in apertural view, 3 rows of spiral striae per 50 µm (measured on the ultimate whorl above the aperture) (Figs 129-131), peristome looks simple in lateral view since the inner peristome is stronger developed and partly covers the outer peristome (Plate 24 fig. 20) ..... *D. mertoni*
14 Umbilicus is closed in adult 15
– Umbilicus is narrowly open in adult ..... *D. timorensis* sp. nov.
15 Columellar denticle is moderately long or small and short 16
– Columellar denticle is very long and prominent, directed downwards ..... *D. moluccensis* sp. nov.
16 Whorls are strongly globose with very deep suture therefore shell outline is wavy 19
– Whorls are rather flat or slightly convex, suture is moderately deep, shell outline not wavy 17
17 Shell narrow and slender 18
– Shell more obese ..... *D. leucopsis*
18 The palatal margin of the outer peristome is sinuous ..... *D. decollata*
– The palatal margin of the outer peristome not or slightly sinuous ..... *D. floris*
19 About 5 ribs per 0.5 mm on the apertural side of the penultimate whorl, parietal margins of the peristome not or hardly sinuous 20
– About 4 ribs per 0.5 mm on the apertural side of the penultimate whorl, parietal margins of both the inner and outer peristomes sinuous ..... *D. torquilla*
20 Aperture is circular, axial ribs are rather strong and high, aperture is tilted about 10-15° to the coiling axis ..... *D. lucifuga*
– Aperture with straight columellar side and angulate basal / columellar junction of the outer peristome, axial ribs moderately strong, aperture is not tilted to the coiling axis ..... *D. fluminis*






Key to ***Moussonia***

1 Shell with strong peristomal rim reinforced by labial callus 2
– Peristomal rim not present 8
2 Shell dextral, conical 3
– Shell sinistroid, cylindrical (up to five early whorls are dextral, shell coiling direction reverses to sinistral from the 5th whorl, 5 early whorls are completely overgrown by the tuba) ..... *M. monstrificabilis* sp. nov.
3 Shell broadly conical 4
– Shell slender, either high conical 5
4 Parietalis Y–like, merged from two parietal lamellae columella with more or less horizontal knob ..... *M. separanda* sp. nov.
– Parietalis simple, knob of the columella is directed upwards ..... *M. pseudoseparanda* sp. nov.
5 Axial ribs very delicate and poorly indicated, shell surface looks smooth or finely axially striate at 80x magnification ..... *M. torricelli* sp. nov.
– Axial ribs more conspicuous 6
6 Shell H ~1 mm, axial ribs very widely-spaced ..... *M. hyponepia*
– Shell H over 1.8 mm, axial ribs are dense 7
7 Shell H 2.5-2.9 mm, shell more obese, the peripheral carina poorly defined ..... *M. omias*
– Shell H up to 2.2 mm, shell slender, the peripheral carina stronger developed ..... *M. papuana*
8 The inner peristome discontinued at the insertion of the columellar denticle, shell less high 9
– The inner peristome continuous, shell high and slender ..... *M. ahena*
9 Rectangular sculpture not present on the teleoconch or is not prominent 10
– Shell sculpture with rather prominent irregularly rectangular cells between spiral and axial sculpture ..... *M. manuselae* sp. nov.
10 W = 8, shell H over 2.5 mm, rectangular sculpture less prominent on shell 11
– W = 7, shell H under 2.5 mm, shell with prominent rectangular sculpture (Plate 28 figs 4 & 6) ..... *M. manuselae* sp. nov.
11 Shell H about 3.5 mm, shell comparatively wider with smaller aperture (Plate 27 fig. 17) ..... *M. hirsuta*
– Shell H about 2.7 mm, shell comparatively slender with larger aperture (Plate 28 fig. 14) ..... *M. strubelli*

Key to ***Arinia*** and ***Palaina***

Since delimitation between *Arinia* and *Palaina* remains unclear (see diagnoses of both genera above), the present key is valid for both groups from the study area.

1 Shell dextral (*Palaina angulata* is assessed in both branches) 2
– Shell sinistral (*Palaina angulata* is assessed in both branches) 23
2 The umbilicus is narrowly open in adult, the operculum with median tubular process on the outer surface ..... *A. talautana*
– Umbilicus is closed in adult 3
3 No axial ribs on last two whorls at 80x magnification, shell is smooth or with inconspicuous axial striation (early whorls with very widely-spaced axial ribs) 4
– Axial ribs more or less prominent even when very widely-spaced, well indicated at 80x or smaller magnification 5
4 Shell obese and large, H ~4 mm ..... *A. crassiventris*
– Shell slender cylindrical and small, H ~1.8-2.1 mm ... . *A. tjendanae*
5 Axial ribs are dense or moderately distant, not ɔ–like bent at the peripheries of the teleoconch whorls and not developed into lamella-like protrudings 6
– Axial ribs are very widely-spaced and strongly ɔ–like bent at the peripheries of the teleoconch whorls in a form of low protrudings (Plate 47 figs 1-3), in juvenile shells ribs develop into spine-like folded protrudings (Plate 47 fig. 4) ..... *P. thomasrinteleni* sp. nov.
6 Shell is very small, H ~1.3-1.4 mm, axial ribs widely-spaced, peristome is strongly double without lamellae between the equally strong inner and outer peristomes ..... *P. minutula* sp. nov.
– Shell H 1.8 mm or larger, margins of the peristome are less strong, several lamellae present in lateral view between the inner and the outer peristomes 7
7 Shell with a strong (large and distinctly angulate) bulb beyond the constriction (visible in apertural view) 8
– When present, bulb is inconspicuous (flat) 13
8 The penultimate whorl not bulbous, not or slightly wider than the penultimate whorl in apertural view 9
– The penultimate whorl bulbous, wider than the penultimate whorl in apertural view .... *P. dianctoides* sp. nov.
9 Columella without backwards directed knob 10
– Columella with a large backwards directed knob ..... *P. telnovi*
10 Peristome is ordinary, not very broad in lateral view 12
– Peristome is conspicuosly broad in lateral view 11
11 H~5-6 mm, columella with flat but distinct basal knob, parietal callus present in the aperture ..... *P. chrysostoma*
H ~3-4 mm, columella with inconspicuous semitransparent basal knob, columellar callus present in the aperture in certain specimens ..... *P. polystoma*
12 Axial ribs generally denser, about 17-20 ribs per 1 mm on the penultimate whorl in apertural view, shell more conical, less obese, axial ribs almost disappear at the constriction, bulb is weak .... *P. vermeuleni* sp. nov.
– Axial ribs generally less dense, about 10-13 ribs per 1 mm on the penultimate whorl in apertural view, shell comparatively more obese, axial ribs becoming denser and more delicate but not disappear at the constriction, bulb is stronger ..... *P. novoguineensis*
13 Shell distinctly conical, teleoconch whorls widen evenly 14






– Shell either obese conical or cylindrical with conical or flattened apex (only few early whorls are conical), teleoconch whorls widen rapidly 16
14 Peristome is thick in lateral view, consists of numerous lamellae between the inner and the outer peristomes 15
– Peristome is thin in lateral view, no or few flat lamellae between the stronger developed inner and outer peristomes ..... *P. brazieri*
15 Shell is large to very large, H ~4.3-5.2 mm, the palatal margin of the peristome is straight, peristome is moderately thick in lateral view ..... *P. gardneri*
– Shell is small, H ~3 mm, the palatal margin of the peristome is strongly sinuous, peristome is very thick in lateral view ..... *P. solomonensis*
16 Shell obese or cylindrical, aperture more or less centered below the penultimate whorl in apertural view, the constriction poorly defined on shell wall 17
– Shell shape high cylindrical, aperture shifted right against the coiling axis in apertural view, the constriction is defined by a distinct impression .. *P. diepenheimi*
17 The outer peristome is not or partly expanding beyond the inner one, not encircling the aperture and not extraordinary broad 18
– The outer peristome expands strongly beyond the inner one, encircles the aperture and is broadly discontinued parietally ..... *A. patagiata*
18 Columella with a large backwards directed knob .. 19
– Columella without knob 20
19 Shell is large and very obese, H ~3.6-3.8 mm, tuba and aperture are strongly ascending ..... *P. ascendens*
– Shell is small and slender cylindrical, H ~1.8-2 mm, tuba and aperture are not ascending ..... *P. carbavica*
20 Shell is small, cylindrical or fusiform, H ~2.05-3 mm, no bulb present 21
– Shell is large, H ~3-4 mm, obese, an inconspicuous bulb beyond the constriction ..... *P. mairasi* sp. nov.
21 Shell cylindrical with short apex (e.g. plate 30 figs 11-13, plate 40 figs 1-9) 22
– Shell with conical apex (Plate 32 figs 1-2, 4-9), the operculum with concentric ridges, W = 5¼–5½ ..... *P. angulata*
22 The outer peristome stronger than the inner one, the inner peristome situated distant from the outer one in lateral view ..... *P. manggaraica*
– The outer peristome not stronger than the inner one, the inner peristome situated close to the outer one in lateral view ..... *A. blanda*
23 The umbilicus is open in adult 24
– The umbilicus is very narrowly open in adult ..... *P. slapcinskyi* sp. nov.
– The umbilicus is closed in adult 27
24 Shell obese 25
– Shell distinctly conical, the umbilicus is broadly open ..... *P. perspectiva* sp. nov.
– Shell high cylindrical, the umbilicus less broadly open ..... *P. mutis* sp. nov.
25 The umbilicus distinct but rather narrow, the tuba is not or slightly ascending, shell is small or large 26
– The umbilicus is broadly open, shell is large, H ~4-4.25 mm, the tuba is strongly ascending ..... *P. megalostoma* sp. nov.
26 Shell is small, H ~1.9-2.2 mm, the ultimate whorl is about as wide as the penultimate whorl in apertural view, aperture is rather small, about a half of the ultimate whorl's width ..... *P. papuamontis* sp. nov.
– Shell is large, H ~3.6-4 mm, the ultimate whorl is significantly broader than the penultimate whorl in apertural view, aperture is more than half of the ultimate whorl's width ..... *P. erythropeplos*
27 Axial ribs simple and not c–like bent on the periphery of the last two whorls 28
– Axial ribs very widely-spaced and c–like bent on the last two whorls, the outer peristome expands very strongly wing-like beyond the inner one ..... *P. tanimbarensis* sp. nov.
28 Axial ribs not very distant (there are more than 8 ribs per 1 mm on the penultimate whorl in apertural view), the outer peristome is not wing-like even if it expands beyond inner one 29
– Axial ribs very distant (about 4–6 ribs per 1 mm on the penultimate whorl in apertural view) except at the constriction, they are lamella-like (fragile), the outer peristome strongly wing-like expands beyond the inner one (Plate 41 figs 10-19) ..... *P. mirifica* sp. nov.
29 Shell distinctly conical, axial ribs in a form of high lamellae (these lamellae are fragile and easily get broken, especially in older specimens) 30
– Shell conical or of different shape, axial ribs are not lamella-like 32
30 The ultimate whorl is narrower than the penultimate whorl in apertural view, axial ribs are not tilted in a direction opposite to the coiling axis 31
– The ultimate whorl is about as wide as the penultimate whorl in apertural view, axial ribs are tilted in a direction opposite to the coiling axis at least on the penultimate whorl (Plate 44 fig. 21) ..... *P. ponsonbyi*
31 Axial ribs are humped and high (Plate 37 figs 13-17), columella with backwards directed median knob (Fig. 55) ..... *P. dohertyi*
– Axial ribs are not humped and comparatively lower (Plate 32 figs 14-19), columella without median knob but is inconspicuously twisted medially (Figs 44-45) ..... *P. attenboroughi* sp. nov.
32 Shell with a strong (large and distinctly angulate) bulb beyond the constriction (visible in apertural view) 33
– When present the post-constriction bulb is inconspicuous (flat) 34
33 Axial ribs are significantly more distant on early whorls than on the last two whorls (Plate 40 figs 14-16), the penultimate whorl is somewhat bulbous in apertural view, shell H ~4 mm ..... *P. aerari*
– Axial ribs almost equally dense on all teleoconch whorls (Plate 34 figs 1-3), the penultimate whorl is not bulbous in apertural view, shell H ~3 mm or less ..... *P. bougainvillei* sp. nov.
34 Tuba is not protruding from shell outline 35




– Tuba is protruding from shell outline (Plate 45, figs 23-24) ..... *P. schneideri*
35 The inner peristome is discontinued parietally or entire and expanding, but then it covers less than a half of the ultimate whorl in apertural view 50
– The inner peristome is entire and expands strongly, covers a half or more of the ultimate whorl 36
36 The penultimate whorl is not or slightly bulbous, not or slightly wider than the ultimate whorl in apertural view 37
– The penultimate whorl bulbous, significantly wider than the ultimate whorl in apertural view ..... *P. papuanorum*
37 Shell broadly conical with evenly widening teleoconch whorls (Plate 35 figs 21-23, plate 38 figs 10-12, plate 47 figs 20, 22-24) 38
– Shell either obese conical, cylindrical, subcylindrical or subovate with conical or flattened apex, the teleoconch whorls widen rapidly 40
38 Peristome is circular (the parietal margin is not straight), not covering all of the penultimate whorl .. 39
– Peristome is subquadrate (the parietal margin straight), expands very strongly and completely covers the ultimate whorl ..... *P. clappi*
39 Axial ribs more widely-spaced, there are about 6 ribs per 0.5 mm on the penultimate whorl (in apertural view), axial lamellae are very dense and delicate at the end of tuba near the peristome, shell is somewhat slender ..... *P. wisemani*
– Axial ribs denser, there are ~7-8 ribs per 0.5 mm, axial lamellae are stronger (higher) and more distant at the end of tuba, shell generally broader ..... *P. floridensis*
40 All teleoconch whorls with almost uniform dense straight or sinuous ribs 41
– Two first teleoconch whorls with very peculiar axial ribbing pattern – ribs are curved backwards and form cup-shaped pits ..... *P. cupulifera*
41 Axial ribs straight or oblique against the coiling axis on the penultimate whorl in apertural view, ribs are not strongly sinuous, shell H not exceeding 3.6 mm 42
– Axial ribs strongly oblique against the coiling axis on the penultimate whorl in apertural view and are distinctly sinuous, shell H ~3.9 mm ..... *P. consobrina*
42 Peristome has two protrudings - near the palatal / parietal and the parietal / columellar junctions (best visible in lateral view) (Plate 39 figs 1 & 3, plate 45 figs 18-19, plate 46 figs 15 & 17) 43
– Peristome without protrudings 45
43 Axial ribs are high, somewhat like low lamellae (Plate 39 figs 104, plate 46 figs 15-17) 44
– Axial ribs are moderately high (Plate 45 figs 18-20), there are 7 ribs per 1 mm ..... *P. scaevola*
44 Columella with a strong basal knob, there are 9-10 axial ribs per 1 mm ..... *P. laszloi* sp. nov.
– Columella is simple with an obtuse median angulation, up to 5 axial ribs per 1 mm ... *P. sparselamellata* sp. nov.
45 The outer peristome is not visible beyond the expanded margin of the inner peristome in apertural view or only parts of it are visible 46
– The outer peristome is slightly expanded, is visible beyond the inner one in apertural view .... *P. leptotoreutos*
46 Shell not strongly obese (Plate 38 figs 29-31, plate 39 figs 12-14, plate 44 figs 26-29), the maximum height of the peristome is less than 50% of shell height 47
– Shell strongly obese, the maximum height of the peristome is about 50% of shell height 49
47 Columellar margin of the peristome is straight or almost straight 48
– Columellar margin of the peristome is sinuous ..... *P. propinqua*
48 The palatal margin of the inner peristome slightly sinuous, the penultimate whorl is as wide as the previous in lateral view (Plate 39 figs 12-14) ..... *P. liliputana*
– The palatal margin of the inner peristome is straight, the penultimate whorl is slightly narrower than the previous one in lateral view (Plate 38 figs 29-31) ..... *P. inconspicua*
49 Aperture is circular, the position of the aperture is shifted left against the coiling axis in apertural view, shell is stronger obese (Plate 45 figs 15-17) ..... *P. repandostoma*
– Aperture is ovoid, the aperture is more or less centered below the penultimate whorl in apertural view, shell is generally slender with conical protoconch (Plate 47 figs 17-19) ..... *P. wawiyai* sp. nov.
50 Suture is moderately or deeply impressed and whorls are convex, the outer peristome without or with less than four protrudings 51
– Suture and whorls are rather flat, the outer peristome with four obtuse protrudings (Plate 45 figs 10-14) ..... *P. quadricornis*
51 Shell about twice higher than broad, shell slender and distinctly conical (Plate 34 figs 13-15, plate 37 figs 22-24) 52
– Shell less than twice higher than broad or shell shape is cylindrical, obese or fusiform and not conical 53
52 Maximum diameter of the peristome in fully grown specimens is significantly narrower than the ultimate whorl in apertural view (Plate 34 fig. 13) ... *P. bundiana*
– Maximum diameter of the peristome in fully grown specimens is almost as wide as the ultimate whorl in apertural view (Plate 37 figs 22 & 28) ..... *P. extremita* sp. nov.
53 The peristome with two or more obtuse angulate sometimes inconspicuous protrudings 54
– The margins of the outer peristome are straight or sinuous, not developed into angulate protrudings 58
54 Peristomal protrudings are derived from the outer peristome, columella without an internal callus 55
– Protrudings are derived from both the inner and the outer peristomes, columella is broad and smooth with glass-like semitransparent callus around its inner margin (Plate 40 figs 17, 19-20) ..... *P. mengen* sp. nov.
55 Shell subovate, rather obese in median part, columella without knob 56
– Shell cylindrical, columella with a very large backwards directed knob (Fig. 82) ..... *P. paradisaea* sp. nov.
56 Operculum with a small Γ–like median “handler” on the inner surface (Plate 41 figs 28-30, plate 43 figs 10-






12) 57
– Operculum with a large and broad handle-like median protruding on the inner surface, columella is simple (Plate 33 figs 10-12) ..... *P. bicornis*
57 Columella with a median knob which is visible in the aperture as a small columellar denticle (Figs 75-76) ..... *P. misoolensis* sp. nov.
– Columella is simple and thin, without knob (Fig. 80) .. *P. onin* sp. nov.
58 Shell generally conical, the teleoconch whorls widen evenly 59
– Shell of different shape, the teleoconch whorls widen rapidly 60
59 Shell generally slender and higher, H ~3.7-6 mm .... *P. novopommerana*
– Shell generally smaller, H ~2.7-3.5 mm .... *P. commixta* [additional material is required to uncover additional specific characters of these two similar species]
60 The outer peristome expands strongly beyond the inner one, broadly encircles the aperture and is broadly discontinued parietally 61
– The outer peristome is not or partly expanding beyond the inner one, not encircling the aperture (if encircling, than is not extraordinary broad) 62
61 Shell is comparatively slender, axial ribs are denser (17-18 ribs per 1 mm on the penultimate whorl), axial ribs not becoming higher on the ultimate whorl ..... *P. granulum*
– Shell is comparatively broader, axial ribs are widely-spaced (about 7 ribs per 1 mm on the penultimate whorl), axial ribs becoming high on the ultimate whorl .. *P. silvicultrix* sp. nov.
62 Shell obese, short subovate with the last two whorls much wider than the previous ones 63
– Shell slender, the last two whorls less strongly wider than the previous ones 65
63 Shell H ~1.75 mm (less than 2 mm) ..... *P. imperfecta* sp. nov.
– Shell H over 2 mm 64
64 The constriction situated on same axis with the parietal side of the aperture, it is defined by denser axial ribs and a sutural impression, shell H ~3.8 mm .. *P. glabella*
– The constriction situated on same axis with the columellar side of the aperture, it is defined by denser axial ribs and a sutural impression, shell H ~2.1-2.3 mm ..... *P. obiensis* sp. nov.
65 Axial ribs becoming max. 2.5x more distant on tuba 66
– Axial ribs becoming 3x more distant on tuba, shell is cylindrical, the palatal margin of the inner peristome is strongly sinuous ..... *P. hartmanni* sp. nov.
66 Shell H less than 3 mm, other characters not meet together like in antithesis 67
– Shell H ~3.5 mm, axial ribs very delicate and rather high, spiral striae very delicate (Plate 35 figs 15-17) ..... *P. citrinella*
67 The operculum is derivative - high (tuba-like), with several layers of concentric lines on the outer surface (Plate 31 fig. 6 & plate 45 fig. 9) 68
– The operculum with or without concentric ridges but is not tuba-like on the outer surface 69
68 Shell rather slender but not conical, the penultimate and the ultimate whorls almost equally wide in apertural view (Plate 31 figs 1-3) ..... *P. adelpha*
– Shell less slender with maximum width on the penultimate whorl (in apertural view) and with broadly conical apex (Plate 45 figs 1-6) ..... *P. psittricha* sp. nov.
69 Columella is straight, slightly curved or twisted, without median knob 70
– Columella with a large median backwards directed knob (Fig. 53) ..... *P. doberai* sp. nov.
70 Axial ribs becoming max 2x more distant on tuba .. 71
– Axial ribs becoming 2.5x more distant on tuba, shell 1.8–2x higher than broad (Plate 39 figs 18-20) ..... *P. louisiade* sp. nov.
71 Shell apex conical, shell is not regularly cylindrical .. 72
– Shell apex is flattened, shell is regularly conical ... 73
72 Columella is rather broad with glass-like semitransparent inner edge (Figs 40-42), shell is predominantly dextral with known sinistral specimens ..... *P. angulata*
– Columella is thin and straight (Fig, 97) ..... *P. yamdena* sp. nov.
73 Spiral striae are rather distinct at 80x magnification (but very delicate and dense at 300x magnification) .. 74
– Spiral striae are lacking at 80x magnification (but very delicate and dense at 300x magnification, there are 9-10 rows of spiral striae per 30 µm measured above the aperture), several lamellae present between the inner and the outer peristome ... *P. flavocylindrica* sp. nov.
74 Columella without basal knob, there are significantly less than 25 ribs per 0.5 mm 75
– Columella with basal knob, there are two rather strong lamellae between the inner and the outer peristome, there are 4 rows of spiral striae per 30 µm (measured above the aperture), 25-28 ribs per 0.5 mm ..... *P. minuscularia* sp. nov.
75 Shell less than 2x higher than broad, peristome is double or triple 76
– Shell rather high cylindrical, about 2x higher than broad, peristome is triple (Plate 32 figs 24-26), shell H ~1.8-2 mm ..... *P. beilanensis*
76 Shell H ~1.1-1.6 mm, peristome is thin in lateral view and consists of a few lamellae 77
– Shell H ~1.8-1.95 mm, peristome is triple, rather broad in lateral view and consists of several dense lamellae, the outer peristome is not or slightly stronger than the inner one (Plate 38 figs 26-28) ..... *P. insulana* sp. nov.
77 The operculum is without concentric ridges 78
– The operculum with low concentric ridges and a shallow median impression on the outer surface .... *P. biroi*
78 Axial ribbing pattern changes evenly starting from the constriction 79
– There are abrupt changes in the axial ribbing pattern - starting from the constriction the ribs becoming coarser and twice more distant 80
79 With a short zone free of axial ribs at the constriction ..... *P. iha* sp. nov.






– Axial ribbing pattern not discontinued at the constriction ..... *P. albrechti* sp. nov.
80 Shell generally lower (Plate 39 figs 5-7), W = 4¾–5, axial ribs more widely-spaced and stronger oblique to the coiling axis, the outer peristome expanding less strongly, columella widening basally (Figs 65-66) .... *P. lengguru* sp. nov.
– Shell generally higher (Plate 47 figs 8-13), W = 5½, axial ribs are denser and slightly oblique to the coiling axis, the outer peristome is comparatively more expanding, columella not widening basally (Figs 94-95) .... *P. waigeo* sp. nov. [the specimen from Wayag has denser ribs on the tuba than Waigeo specimens]

Biogeographic assessment of the Papuan and Wallacean Diplommatinidae (Sulawesi excluded)

Data accumulated during this study allows a preliminary biogeographic assessment. The paucity of phylogenetic information and unequal data available for different parts of the study area prevent this assessment from being comprehensive. Data on species richness and endemism for certain islands and insular groups are discussed in table 19. Generally, *Palaina* is the most diverse genus in this part of the world while *Diplommatina* represents another species-rich group with highest diversity on the Sunda and Banda arcs islands. Species diversity of *Diplommatina* decreases significantly east of Timor and the North Moluccas. Vice versa, *Palaina* becomes less diverse on the Sunda Arc and the Moluccas than it is in Raja Ampat, New Guinea and the Solomon Islands.

Table 19. Geographical records of the Diplommatinidae in Wallacea (Sulawesi excluded) and the Papuan Region.

Geographic island group	**Island or geographical part of large island**	**Number of Diplommatinidae taxa**	**Endemism**
Aru Islands		4	75%
	Kobroor	2	50%
	Maikoor	1	100%
	Tanahbesar	1	100%
Bismarck Archipelago	New Britain	5	100%
Lesser Sunda (Nusa Tenggara) Islands		20	85%
	Flores	8	87%
	Lombok	1	100%
	Sumba	10	60%
	Timor	3	66%
The Moluccas (Aru & Tanimbar islands excluded)		21	100%
of them North Moluccas		15	100%
of them Central Moluccas		6	100%
of them Lease Islands		4	75%
	Ambon	4	20%
	Bacan	1	100%
	Buru	1	100%
	Halmahera	4	75%
	Haruku	3	0%
	Obi Islands (Obira & Belangbelang)	8	87%
	Saparua	2	0%
	Seram	2	50%
	Talaud Islands	1	100%
	Ternate & Tidore	3	66%
Louisiade Islands		2	100%
	Basilaki	1	100%
	Misima & Rossel	1	100%
New Guinea (Cenderawasih Bay Islands excluded)		25	92%
	North New Guinea	6	83%
	Doberai (Bird's Head) Peninsula (southern lowlands only)	4	100%
	West Papua (Onin Peninsula, Bird's Neck Isthmus)	11	92%
	Central Cordillera	2	50%
	East New Guinea (Madang, Milne Bay, Morobe provinces)	5	80%
Cenderawasih Bay Islands		6	100%






	Biak & Owi	6	83%
	Yapen	1	0%
Raja Ampat Islands		25	92%
	Misool, Polee & Yan	16	87.5%
	Waigeo	11	91%
	Wayag	2	50%
Tanimbar Islands	Yamdena	4	100%
Solomon Islands		8	100%
	Bougainville & Buka	1	100%
	Guadalcanal	2	0%
	Nggela (= Florida)	3	66%
	Mono	3	33%
	Makira (= San Cristobal) & Owaraha (= Santa Ana)	2	100%

Lesser Sunda Islands (Nusa Tenggara) species

The Lesser Sunda Islands extend from Lombok in the West to Wetar in the East, forming a chain of small to mid-sized islands of mostly tertiary and quaternary volcanic origin. The largest islands are (west to east) Lombok, Sumbawa, Sumba, Flores, Timor, Alor, and Wetar. While Lombok and Sumbawa situated on the Sunda Arc, other islands of this region are part of the Banda Arc with a geological discontinuity between these two island groups. Being a part of Wallacea, these islands differ considerably from the rest of the study area in their climate and types of habitats. Forests are less common because seasonally dry periods limit forest development and this naturally patchy forest is further reduced by human activity. Lowland forests of the Lesser Sunda Islands are mostly seasonal, and separated by vast grasslands.

Distribution of diplommatinids on these islands is limited to wet montane forests (Sumba, Flores, montane areas of western part of Timor) as well as high altitude limestone outcrops in open areas (eastern part of Timor). Compared to other insular systems within the study area, the diplommatinid fauna of the Lesser Sunda Islands is peculiar due to its high relative diversity of *Diplommatina* species. Of totally 20 diplommatinid species currently reported from Lesser Sunda Islands, there are 12 *Diplommatina* and 8 *Arinia / Palaina* species (although there are few characters differentiating the two genera, as a result there is taxonomic uncertainty between the two genera, consider notes above). *Diplommatina* may be an element of Oriental origin spreading from Greater Sunda Islands eastwards across Sunda Arc and later - Banda Arc islands. While *Palaina*, the most diverse diplommatinid group in the Papuan Region, reach Java from the opposite direction. No diplommatinid records are hitherto known from Alor, Sumbawa and Wetar. Recent material for this study was available from Flores, Timor and Bali (the latter island is outside the study area but lies in proximity of Lombok). Material from Timor-Leste was not available.

Only one diplommatinid species is probably endemic to Lombok.

The Malacofauna of Sumba comprises 6 *Diplommatina* species (one is shared with Greater Sunda Islands, another one with West Timor) and 3 *Arinia* species of which *Arinia* (s. l.) *tjendanae* B. Rensch, 1931 is also known from the Aru Islands.

Flores has one *Arinia*, 4 *Diplommatina* (one species shared with Greater Sunda Islands) and 3 *Palaina* species.

The dry western part of Timor is poorly sampled with 2 *Diplommatina* species (one is shared with Sumba), as well as one *Palaina* species [2].

Generally, the Lesser Sunda Islands are insufficiently researched for Diplommatinidae and the real number of species here is certainly much higher than presently known.

Tanimbar Islands species

The Tanimbar Islands, which were formerly also known as Timorlaut have never been a part of Sahul and never been connected to the Australian plate. The nearest distance between the Tanimbars and the Sahul shelf is about 30 km. Instead, the Tanimbar Islands are the easternmost extension of the Banda Arc. The malacofauna of the Tanimbar Islands is of various origin both Asian and Australian (Vermeulen 1996b). Colonization of the islands from Asia was possible across the Sunda and Banda arcs islands and colonization from Australia was possible across relatively short distances from nearby Papuan islands.

Four *Palaina* species are known from Yamdena, the largest of the Tanimbar Islands, all of them

2 Over ten Diplommatinidae species were collected in Timor-Leste by the Australian Museum expeditions (according to https://australianmuseum.net.au/image/land-snails-of-timor-leste-2). As stated above, this material was not available for my study.









were collected recently and are described in the present work.

Moluccan species

The Moluccas (or Maluku), some thousands of small and a few mid-sized islands, are of various geological origins. For example, the islands that became the arms of Halmahera were in proximity to the north-western coast of New Guinea in their geological past (Polhemus 2007) while the western part of this island is part of a young volcanic belt (Hall et al. 1988). Three main geographical groups can be recognized within the Moluccas: the North Moluccas, which include the Talaud Islands, of which Halmahera, Bacan, Morotai and Obira are the largest; the Central Moluccas of which Seram and Buru are the largest; the South-Eastern Moluccas (from where no Diplommatinidae material was available), which include Key Islands, Banda Islands. The Sula Islands, including Taliabu and Mangole, are administratively part of the North Moluccas but are rather isolated geographically. The Moluccas are covered by lowland rainforests, with few high mountains available (for example, the Manusela Range on Seram).

In total, 21 diplommatinid species are reported from the Moluccas. No records are hitherto available from the South-Eastern Moluccas or the Sula Islands.

The "classic" North Moluccas (Sula Islands excluded) harbour 15 currently known diplommatinid species, none of which shared with other island groups. This is the only island group in the study area from where *Diancta* species are known (5 species in total). *Diplommatina* and *Palaina* are represented by 4 species each, while *Arinia* and *Moussonia* - by one each. Three geographically separated island groups can be recognized within the North Moluccas: a northern group including Halmahera, Bacan, Morotai and their adjacent islands; a southern group, the Obi Islands; and an eastern group encompassing Gebe, Ju and adjacent islets (see Greķe 2012 for further data on the malacofauna of Gebe Island). No diplommatinid records are hitherto available from Gebe. Diplommatinids are represented by 8 species on the southern islands of which only *Diplommatina* (s. l.) *radiiformis* Preston, 1913 is shared with the northern group, as well as with Belangbeland Island and on the northern arm of Halmahera and on Tidore.

The Central Moluccan diplommatinid fauna is comprised of only 6 species, 3 each of *Moussonia* and *Palaina*. Prior to this study, an "endemic" monotypic genus *Anostomella* was described from this region, which is synonymized with *Palaina* in the present publication. Large islands of Buru and Seram have only one and two diplommatinid species respectively, while small and limestone rich Lease Islands just south of Seram are inhabited by 5 species. The Lease Island species have successfully survived centuries of human activities in this area. No recent material was available from Buru Island for this study.

The total number of diplommatinid species is hard to predict for the Moluccas, but it should be at least 4x higher than the 21 species that are presently known.

Raja Ampat species

Of five main islands forming this group: Batanta, Kofiau, Misool, Salawati, Waigeo, diplommatinid material is hitherto only available from Misool, Waigeo, as well as from tiny Polee (Yfpolee) and Wayag. Misool and Waigeo have different geological histories. The Raja Ampat Islands are covered by dense lowland rainforests.

Misool Island is most distant from New Guinea's Doberai Peninsula, about 70 km at closest distance, and about 60 km from Salawati. But this island is fully docked to the western margin of the Australian craton (Beehler 2007). Waigeo lies on the Papuan platform and is situated closer to Doberai and Salawati, but separated from them by the submarine trace of the Sorong Fault. Islands that later became parts of Waigeo were in proximity to the north-western coast of New Guinea in their geological past (Polhemus 2007).

The Misool diplommatinid fauna demonstrates similarity with the lowland fauna of western New Guinea. Eight species were known, mostly from the NW part of the island, an additional 8 species were discovered from our recent surveys in the central and southern parts of the island. One *Diplommatina*, 4 *Moussonia* and 11 *Palaina* species hitherto known from Misool. *Diplommatina* (s. l.) *telnovi* sp. nov. and *Palaina* (s. l.) *novoguineensis* E.A. Smith are shared with Doberai and Onin peninsulas of New Guinea. I project the total number of the Diplommatinidae is at least twice higher on Misool since most of this island remains unexplored by malacologists.

One *Palaina* species also found on a nearby Polee (Yfpolle) Island but is not yet discovered on Misool itself.

The Diplommatinid fauna of Waigeo is comprised of eleven species, of which only one was









known prior to this study. One *Diplommatina* and 10 *Palaina* species occur on Waigeo. None of these species are shared with other geographical areas. Two of the 11 species are already reported from both the western and eastern peninsulas of the island, while 9 species considered restricted to the western peninsula. Additional studies need to be carried out, especially in the eastern and northern parts of the island. I consider the real number of Misool diplommatinid species could be at least 3x higher than presently known. *Palaina waigeo* sp. nov. was also discovered on nearby Wayag islet.

Wayag itself harbors at least two *Palaina* species, one of which is presumably endemic.

A total of 28 diplommatinid species are currently recorded from the Raja Ampat Islands.

Aru Islands species

The Aru Islands are low-lying limestone landbridge islands on the Papuan platform with the fauna generally similar to the southern lowlands of New Guinea (Beehler 2007; Polhemus & Allen 2007). The Aru Islands are covered by dense lowland rainforests. One new and three previously known diplommatinid species: 1 of each *Arinia*, *Diplommatina*, *Moussonia*, and *Palaina* have been reported from Aru. Currently, three species considered endemic to Aru but their occurrence in southern New Guinea is not fully excluded. The record of *Arinia* (s. l.) *tjendanae* B. Rensch, 1931 from Aru Islands is interesting since this species was initially described from Sumba Island of Nusa Tenggara over 1600 km west from Aru. Record of this species in Aru is from primary rainforest habitat, therefore a chance of import from Lesser Sunda Islands is considered low. Without doubt, the diplommatinid fauna of the Aru Islands is not completely known.

Cenderawasih Bay Islands species

Biak, Owi and Supiori islands were not connected to the Papuan platform during the Pleistocene (Polhemus & Allen 2007). While Biak is of Quaternary limestone origin, Supiori demonstrates exposures of island arc volcanics (Polhemus & Allen 2007). Yapen is a land-bridge island and a part of the Mobile Belt affiliated with the Sorong fault (Beehler 2007). The vertebrate fauna and aquatic invertebrate fauna of Yapen is almost lacking endemism (Beehler 2007; Polhemus & Allen 2007) and is similar to the fauna of the north-western lowlands and northern coastal ranges of New Guinea. The rugged Cenderawasih Bay Islands are covered by dense lowland rainforests but flat Biak Island is badly deforested.

Six diplommatinid species, all of the genus *Palaina*, are currently known from Biak and nearby Owi. One of these species is also found on Yapen (see below).

The malacofauna of Yapen is very poorly known and *Palaina* (s. l.) *propinqua* van Benthem Jutting, 1963, is the only diplommatinid species known from there, and is shared with Biak.

No Diplommatinidae records are hitherto known from Numfoor and Supiori.

No recent material was available from Cenderawasih Bay islands for the present study. I estimate the diplommatinid fauna of Biak, Numfoor, Supiori and Yapen will probably include at least 30 species.

New Guinea species

New Guinea is not only World's largest tropical island, but also the most diverse one in terms of available habitats and altitude gradients. Besides Seram, New Guinea is the only island in the study area with alpine vegetation and mountains reaching over 3000 m. The Geological history of New Guinea is very complex and remains incompletely resolved (Polhemus 2007). However, many of New Guinea's habitats, for example alpine habitats, are not likely to be suitable for diplommatinids (see subchapter "Areas where no Diplommatinidae found or expected" below).

Very limited historical material and recent collections of Diplommatinidae are available from New Guinea. Eight species (all *Palaina*) were known from New Guinea prior to this study. Now 25 species are recorded from New Guinea (land area 785753 km^2, compare with 16 species known from Misool of 2034 km^2). Of these 25 species two are shared with Misool Island and 23 considered endemic to particular mountain ranges and geological terranes on New Guinea.

With regard to the geological history of New Guinea and in terms of endemism, I declare Doberai Peninsula (also known as Bird's Head or Kepala Burung) inclusive Bird's Neck Isthmus as an area of endemism for terrestrial snails besides other areas (like northern New Guinea, Central Cordillera).

Except one record based on misidentification species from Manokwari surroundings (van Benthem Jutting 1963), no diplommatinid records from Doberai Peninsula were published until now. Despite intensive searches, Diplommatinidae are unknown from the mountainous northern half of the peninsula (Arfak & Tamarau mountains) while






4 species (*Diplommatina* and *Palaina* 2 each) are known from southern lowlands of Doberai. Bomberai Peninsula is an area without diplommatinid records while the attached Onin Peninsula harbors 8 species (2 *Diplommatina*, 1 *Moussonia*, 5 *Palaina*). Of these *Diplommatina* (s. l.) *telnovi* sp. nov. is shared with lowlands of Doberai Peninsula and Misool Island and *Palaina* (s. l.) *novoguineensis* E.A. Smith, 1897 also occurs on limestone anticlines of the Bird's Neck Isthmus. Phylogenetically very conspicuous *Moussonia pseudoseparanda* sp. nov. has its closest relatives *M. monstrificabilis* sp. nov. and *M. separanda* sp. nov. on Misool Island. The Bird's Neck anticline houses a fauna of 5 species (1 *Moussonia* and 4 *Palaina*).

Northern New Guinea has a different geological past and is inhabited by 6 species (1 *Moussonia* and 5 *Palaina*) of which *Palaina* (s. l.) *papuanorum* Soós, 1911 also known from eastern New Guinea. Two *Palaina* species known from Lake Sentani surroundings while one *Moussonia* and one other *Palaina* considered endemic to the Torricelli Mountains.

The Eastern part of New Guinea is inhabited by 5 *Palaina* species of which one is shared with northern New Guinea (see above).

Only one peculiar species *Palaina* (s. l.) *papuamontis* sp. nov. is known from New Guinea's Central Cordillera.

It is slightly possible to estimate the potential richness of New Guinea's diplommatinid fauna, but it is likely to be at least 100 species.

Louisiade Islands species

The Louisiade Islands are a string of ten rather small volcanic islands frequently fringed by coral reefs, and numerous coral islets located just southeast to nearly 200 km southeast of New Guinea, stretching over more than 160 kilometres, these islands are covered by lowland and lower montane rainforests.

One *Diplommatina* and one *Palaina* are known from these islands while 10 more species are predicted.

Bismarck Archipelago species

The Bismarck Archipelago, including the Admiralty Islands, are islands of volcanic origin situated between New Guinea and the Solomon Islands. There are also vast areas of raised limestone and deep limestone caves. Main islands are New Britain, New Ireland, Manus, and New Hanover. These islands covered by dense lowland to mid-montane rainforests. Diplommatinidae records are only available from New Britain Island. This includes both historical as well as a limited recent material.

Only 5 *Palaina* species are currently known from New Britain, none of them is shared with other archipelago's islands or New Guinea. The estimated total diplommatinid fauna of this archipelago will probably be at least 5x higher.

Solomon Islands species

Geologically the Solomon Islands consist of a double chain of volcanic islands and coral atolls including the Papua New Guinea's autonomous territory of Bougainville which includes Buka and neighbour islands. Except the two aforementioned, other islands of the archipelago lie in two parallel chains running northwest to southeast. Volcanoes are abundant and the terrain is mountainous, with peaks up to 2330 m.

The diplommatinid fauna consists of eight *Palaina* species, all endemic to the archipelago. *Palaina* (s. l.) *aerari* (Dell, 1955) and *Palaina* (s. l.) *gardneri* Dell, 1955 are two species with largest distribution area of about 600 km shared between Bougainville, its adjacent islands and the Guadalcanal Islands. The remaining 6 species are more limited in their distribution. No diplommatinid material is hitherto available from large islands of Choiseul, Malaita, New Georgia and Santa Isabel. No recent material from the Solomon Islands was available for this study. Additional studies are required throughout the Solomon Islands and the projected number of diplommatinid species is probably at least 5x higher than present.

Areas where no Diplommatinidae were found or are expected

Diplommatinids are silvicolus snails closely connected with forest habitats especially rainforests. Like many other terrestrial molluscs Diplommatinidae are most abundant and diverse on calcareous soils. Granite, igneous, clay, and slate substrates are widely known as unfavourable for them (Beddard 1895). The geological history of Wallacea and the Papuan Region is very complex (Polhemus 2007). Distribution of soils in the study area is influenced by the combined effect of major soil-forming factors, namely climate, vegetation, relief, parent material, and time (Hope & Hartemink 2007). Since distribution of favourable and less favourable habitats (e.g. forests versus open






habitats, limestone soils versus granite, basalt or clay, dry and semidry areas versus wet areas) have some peculiarities, there are certain parts within the study area where diplommatinid snails were not found and are not expected (Maps 2-4). It is speculative to declare absence of a species or a group in a certain area, because confirming the absence of a species is much more time-consuming than confirming its presence, especially for minute species like diplommatinids that require sieving and other specialized sampling techniques. This statement is based on my personal experience in 2007-2017 and on the calculations, taking into account the area and present diversity.

1. Southern semidry eucalypt forests on ultisol (clay), Trans-Fly savannah: Our extensive studies gave no results and it is unlikely this large area is inhabited by diplommatinids. Gallery rainforests along numerous watercourses however can hold diplommatinid populations and are potential distribution corridors for them.

2. The Central Cordillera above the tree line: Generally, the upper montane (2500 m and over) rainforest areas, and areas over tree line. No diplommatinid material is available from high altitudes in the study area, no species are known from coniferous and myrtle forests, as well as from the alpine vegetation.

3. Lowland swamp areas in southern New Guinea: Our extensive studies failed to find diplommatinids in these habitats and it is unlikely this large area is inhabited by diplommatinids.

4. Basalt, granite, and heavy metals rich rock formations are unlikely to contain diplommatinids, although the presence of diplommatinid snails is not completely excluded. My intensive surveys in granite rock and soil areas in southern Misool near Aduway village failed to uncover any Diplommatinidae, although nearby areas just 15 km N or 26 km NE of Aduway support over 15 diplommatinid species. Similarly, the predominantly igneous Tamarau Mountains did not harbour any species despite presence of isolated limestone areas. Also Arfak mountains along a transect from Ransiki toward Mokwam village through Anggi Lakes area gave no diplommatinid snails. Areas like northern Waigeo and adjacent Manuran islet, western tip of Obira, E tip of SE arm of Halmahera (area N and NE of Patani) do not harbour any diplommatinids primarily because of presence of heavy metals in the soil.

5. Mangrove forests with high salt content generally considered unsuitable for terrestrial soil dwelling snails.

Annotated list of the Papuan and Wallacean Diplommatinidae (Sulawesi excluded)

See Hamer & Slotow (2002) for categories of endemism.

***Arinia* s. l. H. et A. Adams, 1856** (5 species)
Arinia (s. l.) *blanda* E.A. Smith, 1897
Distribution: Flores Island (Lesser Sunda Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: unknown.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Arinia (s. l.) *crassiventris* B. Rensch, 1931
Distribution: Sumba Island (Lesser Sunda Islands).
Endemism: geographical, regional, local endemic.
Number of localities: 3 (pre-1990), 0 (post-1990).
Habitat: seasonal secondary & primary forests.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Arinia (s. l.) *patagiata* van Benthem Jutting, 1958
Distribution: Sumba Island (Lesser Sunda Islands).
Endemism: geographical, regional, site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: Areca & coconut stand.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Arinia (s. l.) *talautana* (Fulton, 1899)
Distribution: Talaud Islands.
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: unknown.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Arinia (s. l.) *tjendanae* B. Rensch, 1931
Distribution: Sumba Island (Lesser Sunda Islands), Kobroor Island (Aru Islands).
Endemism: widely distributed.
Number of localities: 3 (pre-1990), 1 (post-1990).
Habitat: riverine forests, primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

***Diancta* s. str. Martens, 1864** (5 species)
Diancta (s. str.) *constricta* (Martens, 1864)
Distribution: Ternate & Tidore islands (North Moluccas).
Endemism: geographical, regional & local endemic.
Number of localities: 1 (pre-1990), 1 (post-1990).
Habitat: primary & secondary lowland rainforests.
Altitude zone: lowlands.






IUCN assessment: Endangered.

Diancta (s. str.) *halmaherica* sp. nov.
Distribution: Halmahera Island (North Moluccas).
Endemism: geographical, regional & local endemic.
Number of localities: 2 (post-1990).
Habitat: primary & secondary lowland rainforests.
Altitude zone: lowlands.
IUCN assessment: Vulnerable.

Diancta (s. str.) *multiplicata* von Möllendorff, 1902
Distribution: Obi Islands (North Moluccas).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: unknown.
Altitude zone: unknown.
IUCN assessment: Data Deficient.

Diancta (s. str.) *obiensis* sp. nov.
Distribution: Obira Island, Obi Islands (North Moluccas).
Endemism: geographical, regional & local endemic.
Number of localities: 2 (post-1990).
Habitat: secondary lowland rainforests, gardens.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Diancta (s. str.) *torta* O. Boettger, 1891
Distribution: Bacan Island (North Moluccas).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: unknown.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

***Diplommatina* s. l. Benson, 1849** (22 species)
Diplommatina (s. l.) *baliana* (Fulton, 1899)
Distribution: Sumba Island (Lesser Sunda Islands), Bali, Java, Madura islands (Greater Sunda Islands).
Endemism: widely distributed.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: primary lowland to mid montane rainforests on limestone & volcanic soils.
Altitude zone: lowlands up to 2900 m.
IUCN assessment: Data Deficient.

Diplommatina (s. l.) *decollata* van Benthem Jutting, 1958
Distribution: Sumba Island (Lesser Sunda Islands).
Endemism: geographical, regional & local endemic.
Number of localities: 2 (pre-1990), 0 (post-1990).
Habitat: seasonal secondary & primary forests, lowland rainforests.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Diplommatina (s. l.) *floresiana* E.A. Smith, 1897
Distribution: Flores Island (Lesser Sunda Islands).
Endemism: geographical, regional & local endemic.
Number of localities: 1 (pre-1990), 2 (post-1990).
Habitat: lower and mid montane rainforests on volcanic soils.
Altitude zone: 1200-2205 m.
IUCN assessment: Near Threatened.

Diplommatina (s. l.) *floris* B. Rensch, 1931
Distribution: Flores Island (Lesser Sunda Islands).
Endemism: geographical, regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: montane rainforests.
Altitude zone: unknown.
IUCN assessment: Data Deficient.

Diplommatina (s. l.) *fluminis* B. Rensch, 1931
Distribution: Sumba, Timor islands (Lesser Sunda Islands).
Endemism: regional endemic.
Number of localities: 2 (pre-1990), 0 (post-1990).
Habitat: riverine forests.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Diplommatina (s. l.) *javana* von Möllendorff, 1897
= *Diplommatina javana orientalis* B. Rensch, 1931
Distribution: Flores Island (Lesser Sunda Islands), Bali & Java islands (Greater Sunda Islands).
Endemism: widely distributed.
Number of localities: 2 (pre-1990), 0 (post-1990).
Habitat: primary & secondary lower to mid montane rainforests on volcanic soils.
Altitude zone: up to 2700 m.
IUCN assessment: Least Concern.

Diplommatina (s. l.) *jonabletti* sp. nov.
Distribution: Flores Island (Lesser Sunda Islands).
Endemism: geographical, regional & local endemic.
Number of localities: 1 (pre-1990), 3 (post-1990).
Habitat: primary lower to mid montane rainforests on volcanic soils.
Altitude zone: 1200-2205 m.
IUCN assessment: Endangered.

Diplommatina (s. l.) *leucopsis* van Benthem Jutting, 1958
Distribution: Sumba Island (Lesser Sunda Islands).
Endemism: geographical, regional & local endemic.
Number of localities: 2 (pre-1990), 0 (post-1990).
Habitat: seasonal lowland forests.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Diplommatina (s. l.) *lombockensis* E.A. Smith, 1898
Distribution: Lombok Island (Lesser Sunda Islands).
Endemism: geographical & regional endemic, ? site






endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: unknown.
Altitude zone: unknown.
IUCN assessment: Data Deficient.

Diplommatina (s. l.) *lucifuga* van Benthem Jutting, 1958
Distribution: Sumba Island (Lesser Sunda Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: Areca & coconut stand.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Diplommatina (s. l.) *maibrat* sp. nov.
Distribution: southern lowlands of Doberai Peninsula (W New Guinea).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Diplommatina (s. l.) *mertoni* C.R. Boettger, 1922
Distribution: Maikoor Island (Aru Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 1 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Diplommatina (s. l.) *moluccensis* sp. nov.
Distribution: Ternate & Tidore islands (North Moluccas).
Endemism: geographical, regional & local endemic.
Number of localities: 2 (post-1990).
Habitat: secondary lowland rainforests on volcanic soil.
Altitude zone: lowlands.
IUCN assessment: Endangered.

Diplommatina (s. l.) *patani* sp. nov.
Distribution: Halmahera Island (North Moluccas).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: old-growth secondary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Diplommatina (s. l.) *radiiformis* Preston, 1913
Distribution: Belangbelang, Halmahera, Tidore islands (North Moluccas).
Endemism: geographical endemic of North Moluccas.
Number of localities: 1 (pre-1990), 3 (post-1990).
Habitat: primary & secondary lowland rainforests on limestone & volcanic soils.
Altitude zone: lowlands.
IUCN assessment: Least Concern.

Diplommatina (s. l.) *slapcinskyi* sp. nov.
Distribution: Obira Island, Obi Islands (North Moluccas).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: primary & secondary lowland rainforests, gardens.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Diplommatina (s. l.) *smithi* Kobelt et von Möllendorff, 1898
Distribution: Onin Peninsula (W New Guinea).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 1 (post-1990).
Habitat: unknown.
Altitude zone: unknown.
IUCN assessment: Data Deficient.

Diplommatina (s. l.) *symmetrica* Hedley, 1891
Distribution: Basilaki Island (Louisiade Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 1 (post-1990).
Habitat: *Pandanus* stand.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Diplommatina (s. l.) *telnovi* sp. nov.
Distribution: southern lowlands of Doberai Peninsula, Onin Peninsula (W New Guinea), Misool Island (Raja Ampat Islands).
Endemism: geographical endemic of W New Guinea.
Number of localities: 6 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Least Concern.

Diplommatina (s. l.) *timorensis* sp. nov.
Distribution: Timor Island (Lesser Sunda Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: mid montane limestone rocks.
Altitude zone: 1620-1630 m.
IUCN assessment: Data Deficient.

Diplommatina (s. l.) *torquilla* van Benthem Jutting, 1958
Distribution: Sumba Island (Lesser Sunda Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: unknown.






Altitude zone: unknown.
IUCN assessment: Data Deficient.

Diplommatina (s. l.) *waigeoensis* sp. nov.
Distribution: Waigeo Island (Raja Ampat Islands).
Endemism: geographical, regional & local endemic.
Number of localities: 5 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Endangered.

Moussonia O. Semper, 1865 (12 species)
Moussonia ahena (Preston, 1913)
Distribution: Belangbelang Island, Obi Islands (North Moluccas).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: unknown.
Altitude zone: lowlands.
IUCN assessment: Data Deficient

Moussonia echinata sp. nov.
Distribution: Bird's Neck Isthmus (W New Guinea).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Moussonia hirsuta (Zilch, 1953)
Distribution: Buru Island (Central Moluccas).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: unknown.
Altitude zone: unknown.
IUCN assessment: Data Deficient.

Moussonia hyponepia (van Benthem Jutting, 1958) comb. nov.
Distribution: Misool Island (Raja Ampat Islands).
Endemism: geographical & regional endemic, ? local endemic.
Number of localities: 2 (pre-1990), 0 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Moussonia manuselae sp. nov.
Distribution: Seram Island (Central Moluccas).
Endemism: geographical, regional, ? local endemic.
Number of localities: 2 (post-1990).
Habitat: primary lowland rainforests.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Moussonia monstrificabilis sp. nov.
Distribution: Misool Island (Raja Ampat Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Least Concern.

Moussonia omias (van Benthem Jutting, 1958) comb. nov.
Distribution: Misool Island (Raja Ampat Islands).
Endemism: geographical & regional endemic, ? local endemic.
Number of localities: 2 (pre-1990), 0 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Moussonia papuana (Tapparone Canefri, 1883)
Distribution: Tanahbesar Island (Aru Islands).
Endemism: geographical & regional endemic, ? local endemic.
Number of localities: 1 (pre-1990), 1 [identification uncertain] (post-1990).
Habitat: unknown.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Moussonia pseudoseparanda sp. nov.
Distribution: Onin Peninsula (W New Guinea).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Moussonia separanda sp. nov.
Distribution: Misool Island & Yan islet offshore Misool (Raja Ampat Islands).
Endemism: geographical & regional endemic, ? local endemic (see comments on distribution of this species in its description).
Number of localities: 3 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Least Concern.

Moussonia strubelli (O. Boettger, 1891)
Distribution: Ambon Island, Lease Islands (Central Moluccas).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: unknown.
Altitude zone: unknown.
IUCN assessment: Data Deficient.






Moussonia torricelli sp. nov.
Distribution: Torricelli Mountains (N New Guinea).
Endemism: geographical & regional endemic, ? local endemic.
Number of localities: 3 (post-1990).
Habitat: primary lowland rainforests.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

***Palaina* s. l. O. Semper, 1865** (77 species)
= *Anostomella* Martens, 1867 syn. nov.
Palaina (s. l.) *adelpha* Soós, 1911
Distribution: Madang Province (NE New Guinea).
Endemism: geographical, regional & local endemic.
Number of localities: 1 (pre-1990), 6 (post-1990).
Habitat: primary lowland to mid montane rainforests on limestone and granite soils.
Altitude zone: up to 2300 m.
IUCN assessment: Least Concern.

Palaina (s. l.) *aerari* (Dell, 1955) comb. nov.
= *Palaina megamorpha* Solem, 1960 syn. nov.
Distribution: Mono Island, Bougainville Group, Florida and Guadalcanal islands (Solomon Islands).
Endemism: geographical endemic of Solomon Islands.
Number of localities: 4 (pre-1990), 0 (post-1990).
Habitat: lowland rainforests.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *albrechti* sp. nov.
Distribution: Torricelli Mountains (N New Guinea).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: primary lowland rainforests.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *angulata* O. Boettger, 1891
Distribution: Ambon, Haruku & Saparua islands, Lease Islands (Central Moluccas).
Endemism: geographical & regional endemic, local endemic.
Number of localities: 4 (pre-1990), 7 (post-1990).
Habitat: primary and secondary rainforests on limestone.
Altitude zone: lowlands up to 1000 m.
IUCN assessment: Endangered.

Palaina (s. l.) *ascendens* (Martens, 1864)
Distribution: Ambon, Haruku & Saparua islands, Lease Islands (Central Moluccas).
Endemism: geographical & regional endemic, local endemic.
Number of localities: 1 (pre-1990), 6 (post-1990).
Habitat: primary and secondary rainforests, gardens.
Altitude zone: lowlands.
IUCN assessment: Endangered.

Palaina (s. l.) *attenboroughi* sp. nov.
Distribution: Misool Island (Raja Ampat Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Least Concern.

Palaina (s. l.) *beilanensis* Preston, 1913
Distribution: Belangbelang Island, Obi islands (North Moluccas).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: unknown.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *bicornis* van Benthem Jutting, 1958
Distribution: Misool Island (Raja Ampat Islands).
Endemism: geographical & regional endemic, local endemic.
Number of localities: 2 (pre-1990), 2 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Least Concern.

Palaina (s. l.) *biroi* Soós, 1911
Distribution: Chimbu & Madang provinces (NE New Guinea).
Endemism: geographical & regional endemic, local endemic.
Number of localities: 1 (pre-1990), 10 (post-1990).
Habitat: primary & secondary lowland to upper montane rainforests, gardens.
Altitude zone: lowlands up to 3300 m.
IUCN assessment: Least Concern.

Palaina (s. l.) *bougainvillei* sp. nov.
Distribution: Bougainville, Buka islands, Bougainville Group (PNG part of Solomon Islands).
Endemism: geographical & regional endemic, local endemic.
Number of localities: 2 (post-1990).
Habitat: abandoned coconut plantations, degraded lowland rainforests.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *brazieri* (Cox, 1870)
Distribution: Makira (= San Cristobal) Island (Solomon islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: lowland and lower montane rainforests.
Altitude zone: lowlands and lower mountains.
IUCN assessment: Data Deficient.






Palaina (s. l.) *bundiana* Wiktor, 1998
Distribution: Madang province (NE New Guinea).
Endemism: geographical & regional endemic, ? local endemic.
Number of localities: 3 (post-1990).
Habitat: gardens & degraded rainforests.
Altitude zone: 1300-1400 m.
IUCN assessment: Data Deficient.

Palaina (s. l.) *carbavica* O. Boettger, 1891
Distribution: Ambon, Haruku islands, Lease Islands and Seram Island (Central Moluccas).
Endemism: geographical, regional & local endemic.
Number of localities: 2 (pre-1990), 5 (post-1990).
Habitat: primary & secondary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Near Threatened.

Palaina (s. l.) *chrysostoma* E.A. Smith, 1897
Distribution: Flores Island (Lesser Sunda Islands).
Endemism: geographical, regional & local endemic.
Number of localities: 1 (pre-1990), 2 (post-1990).
Habitat: primary lowland to mid montane rainforests.
Altitude zone: 525-1575 m.
IUCN assessment: Near Threatened.

Palaina (s. l.) *citrinella* van Benthem Jutting, 1963
Distribution: Lake Sentani area (N New Guinea).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: lowland rainforest on limestone.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *clappi* Solem, 1960
Distribution: Nggela (= Florida) Island (Solomon Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: unknown.
Altitude zone: unknown.
IUCN assessment: Data Deficient.

Palaina (s. l.) *commixta* I. Rensch, 1937
= *Palaina commixta jacquinoti* I. Rensch, 1937 syn. nov.
Distribution: New Britain Island (Bismarck Archipelago).
Endemism: geographical, regional & local endemic.
Number of localities: 3 (pre-1990), 4 (post-1990).
Habitat: primary & secondary lowland rainforests.
Altitude zone: lowlands.
IUCN assessment: Least Concern.

Palaina (s. l.) *consobrina* van Benthem Jutting, 1963
Distribution: Lake Sentani area (N New Guinea).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: lowland rainforest on limestone.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *cupulifera* van Benthem Jutting, 1963
Distribution: Biak Island (Cenderawasih Bay Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: swampy lowland rainforest on limestone.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *dianctoides* sp. nov.
Distribution: Onin Peninsula (W New Guinea).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: limestone rocks, primary lowland rainforest.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *diepenheimi* (Preston, 1913) comb. nov.
Distribution: Belangbelang Island, Obi Islands (North Moluccas).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: unknown.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *doberai* sp. nov.
Distribution: southern lowlands of Doberai Peninsula (W New Guinea).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: primary lowland rainforests.
Altitude zone: lowlands.
IUCN assessment: Near Threatened.

Palaina (s. l.) *dohertyi* E.A. Smith, 1897
Distribution: Onin Peninsula (W New Guinea).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 1 (post-1990).
Habitat: primary lowland rainforests.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *erythropeplos* van Benthem Jutting, 1958
Distribution: Misool Island (Raja Ampat Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).






Habitat: unknown.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *extremita* sp. nov.
Distribution: Milne Bay Province (E New Guinea).
Endemism: geographical & regional endemic, ? local endemic.
Number of localities: 2 (post-1990).
Habitat: lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Near Threatened.

Palaina (s. l.) *flavocylindrica* sp. nov.
Distribution: Bird's Neck Isthmus (W New Guinea).
Endemism: geographical & regional endemic, ? local endemic.
Number of localities: 2 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Least Concern.

Palaina (s. l.) *floridensis* Solem, 1960
Distribution: Nggela (= Florida) Island (Solomon Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: rainforest.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *gardneri* Dell, 1955
= *Palaina delli* Clench, 1965 syn. nov.
Distribution: Mono Island, Bougainville Group & Guadalcanal Island (Solomon Islands).
Endemism: geographical endemic of Solomon Islands.
Number of localities: 2 (pre-1990), 0 (post-1990).
Habitat: rainforest.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *glabella* van Benthem Jutting, 1963
Distribution: Biak Island (Cenderawasih Bay Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: unknown.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *granulum* I. et B. Rensch, 1929
Distribution: New Britain (Bismarck Archipelago).
Endemism: geographical & regional endemic, ? local endemic.
Number of localities: 2 (pre-1990), 0 (post-1990).
Habitat: unknown.
Altitude zone: unknown.
IUCN assessment: Data Deficient.

Palaina (s. l.) *hartmanni* sp. nov.
Distribution: Waigeo Island (Raja Ampat islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 2 (post-1990).
Habitat: secondary lowland rainforest on limestone.
Altitude zone: lowlands.
IUCN assessment: Near Threatened.

Palaina (s. l.) *iha* sp. nov.
Distribution: Onin Peninsula (W New Guinea).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: lowland rainforests.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *imperfecta* sp. nov.
Distribution: Waigeo Island (Raja Ampat Islands).
Endemism: geographical, regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: unknown.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *inconspicua* van Benthem Jutting, 1963
Distribution: Biak Island (Cenderawasih Bay Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: unknown.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *insulana* sp. nov.
Distribution: Polee Island S of Misool Is. (Raja Ampat Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: primary lowland rainforest on limestone.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *laszloi* sp. nov.
Distribution: Wayag Island (Raja Ampat Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *lengguru* sp. nov.
Distribution: Bird's Neck Isthmus (W New Guinea).
Endemism: geographical & regional endemic, ? site endemic.





Number of localities: 2 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Least Concern.

Palaina (s. l.) *leptotoreutos* van Benthem Jutting, 1958
Distribution: Misool Island (Raja Ampat Islands).
Endemism: geographical & regional endemic, ? local endemic.
Number of localities: 2 (pre-1990), 0 (post-1990).
Habitat: unknown.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *liliputana* van Benthem Jutting, 1963
Distribution: Biak Island (Cenderawasih Bay Islands).
Endemism: geographical & regional endemic, ? local endemic.
Number of localities: 3 (pre-1990), 0 (post-1990).
Habitat: unknown.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *louisiade* sp. nov.
Distribution: Misima & Rossel [identification uncertain] islands (Louisiade Islands).
Endemism: geographical & regional endemic, ? local endemic.
Number of localities: 1 (possible 2 since identification of Rossel Island specimen is not certain) (post-1990).
Habitat: limestone rocks.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *mairasi* sp. nov.
Distribution: Bird's Neck Isthmus (W New Guinea).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: primary & secondary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Least Concern.

Palaina (s. l.) *manggaraica* (E.A. Smith, 1897) comb. nov.
Distribution: Flores Island (Lesser Sunda Islands).
Endemism: geographical & regional endemic, local endemic.
Number of localities: 1 (pre-1990), 2 (post-1990).
Habitat: primary lower montane rainforests.
Altitude zone: 1575-1850 m.
IUCN assessment: Endangered.

Palaina (s. l.) *megalostoma* sp. nov.
Distribution: Waigeo Island (Raja Ampat Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: primary lowland rainforest on limestone.
Altitude zone: lowlands.
IUCN assessment: Near Threatened.

Palaina (s. l.) *mengen* sp. nov.
Distribution: New Britain Island (Bismarck Archipelago).
Endemism: geographical & regional endemic, ? local endemic.
Number of localities: 3 (post-1990).
Habitat: primary & secondary lower montane rainforests.
Altitude zone: 850-900 m.
IUCN assessment: Data Deficient.

Palaina (s. l.) *minuscularia* sp. nov.
Distribution: Misool Island (Raja Ampat Islands).
Endemism: geographical, regional & local endemic.
Number of localities: 2 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Least Concern.

Palaina (s. l.) *minutula* sp. nov.
Distribution: Halmahera Island (North Moluccas).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *mirifica* sp. nov.
Distribution: Yamdena Island (Tanimbar Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *misoolensis* sp. nov.
Distribution: Misool Island (Raja Ampat Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: primary lowland rainforest on limestone.
Altitude zone: lowlands.
IUCN assessment: Least Concern.

Palaina (s. l.) *mutis* sp. nov.
Distribution: Timor Island (Lesser Sunda Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: lower montane moist eucalypt forest.
Altitude zone: 1620-1630 m.
IUCN assessment: Near Threatened.






Palaina (s. l.) *novoguineensis* E.A. Smith, 1897
Distribution: Onin Peninsula & Bird's Neck Isthmus (W New Guinea), Misool Island (Raja Ampat Islands).
Endemism: endemic of the Papuan Region.
Number of localities: 1 (pre-1990), 3 (post-1990).
Habitat: primary lowland rainforests.
Altitude zone: lowlands.
IUCN assessment: Least Concern.

Palaina (s. l.) *novopommerana* I. et B. Rensch, 1929
= *Palaina vexator* I. et B. Rensch, 1929 syn. nov.
Distribution: New Britain Island (Bismarck Archipelago).
Endemism: geographical & regional endemic.
Number of localities: 5 (pre-1990), 1 (post-1990).
Habitat: secondary lowland rainforests.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *obiensis* sp. nov.
Distribution: Obira Island, Obi Islands (North Moluccas).
Endemism: geographical, regional & local endemic.
Number of localities: 2 (post-1990).
Habitat: primary & secondary lowland rainforests, gardens.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *onin* sp. nov.
Distribution: Onin Peninsula (W New Guinea).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: primary lowland rainforest on limestone.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *papuamontis* sp. nov.
Distribution: Central Cordillera (Central New Guinea).
Endemism: geographical & regional endemic, ? local endemic.
Number of localities: 2 (post-1990).
Habitat: mid montane rainforests.
Altitude zone: 2050-2200 m.
IUCN assessment: Near Threatened.

Palaina (s. l.) *papuanorum* Soós, 1911
Distribution: West Sepik & Morobe provinces (N & NE New Guinea).
Endemism: geographical & regional endemic.
Number of localities: 2 (pre-1990), 0 (post-1990).
Habitat: unknown.
Altitude zone: unknown.
IUCN assessment: Data Deficient.

Palaina (s. l.) *paradisaea* sp. nov.
Distribution: Waigeo Island (Raja Ampat Islands).
Endemism: geographical & regional endemic, ? local endemic.
Number of localities: 2 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Least Concern.

Palaina (s. l.) *perspectiva* sp. nov.
Distribution: southern lowlands of Doberai Peninsula (W New Guinea).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: primary lowland rainforest on limestone.
Altitude zone: lowlands.
IUCN assessment: Near Threatened.

Palaina (s. l.) *polystoma* B. Rensch, 1931
Distribution: Flores Island (Lesser Sunda Islands).
Endemism: geographical & regional endemic.
Number of localities: 1 (pre-1990), 3 (post-1990).
Habitat: primary lowland to mid montane rainforests.
Altitude zone: up to 2200 m.
IUCN assessment: Endangered.

Palaina (s. l.) *ponsonbyi* Sykes, 1903
Distribution: Waigeo Island (Raja Ampat Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 1 (post-1990).
Habitat: unknown.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *propinqua* van Benthem Jutting, 1963
Distribution: Biak & Yapen islands (Cenderawasih Bay Islands).
Endemism: geographical & regional endemic.
Number of localities: 2 (pre-1990), 0 (post-1990).
Habitat: sago swamp.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *psittricha* sp. nov.
Distribution: Misool Island (Raja Ampat Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Least Concern.

Palaina (s. l.) *quadricornis* van Benthem Jutting, 1958
Distribution: Misool Island (Raja Ampat Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: unknown.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.






Palaina (s. l.) *repandostoma* van Benthem Jutting, 1963
Distribution: Biak Island (Cenderawasih Bay Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: unknown.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *scaevola* van Benthem Jutting, 1958
Distribution: Misool Island (Raja Ampat Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: unknown.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *silvicultrix* sp. nov.
Distribution: Waigeo Island (Raja Ampat Islands).
Endemism: geographical, regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: unknown.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *schneideri* I. et B. Rensch, 1929
Distribution: New Britain Island (Bismarck Archipelago).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 2 (pre-1990), 0 (post-1990).
Habitat: riverine lowland rainforests.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *slapcinskyi* sp. nov.
Distribution: Torricelli Mountains (N New Guinea).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 2 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Least Concern.

Palaina (s. l.) *solomonensis* (Dell, 1955) comb. nov.
Distribution: Mono Island (Solomon Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (pre-1990), 0 (post-1990).
Habitat: lowland rainforest.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *sparselamellata* sp. nov.
Distribution: Waigeo Island (Raja Ampat Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: lowland rainforest on limestone.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *tanimbarensis* sp. nov.
Distribution: Yamdena Island (Tanimbar Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *telnovi* sp. nov.
Distribution: Waigeo Island (Raja Ampat Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 2 (post-1990).
Habitat: secondary lowland rainforest on limestone.
Altitude zone: lowlands.
IUCN assessment: Endangered.

Palaina (s. l.) *thomasrinteleni* sp. nov.
Distribution: Yamdena Island (Tanimbar Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *vermeuleni* sp. nov.
Distribution: Kobroor Island (Aru Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *waigeo* sp. nov.
Distribution: Waigeo Island, Wayag Island (Raja Ampat Islands).
Endemism: geographical & regional endemic.
Number of localities: 1 (post-1990).
Habitat: lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Palaina (s. l.) *wawiyai* sp. nov.
Distribution: Waigeo Island (Raja Ampat Islands).
Endemism: geographical, regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: unknown.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.






Palaina (s. l.) *wisemani* (Cox, 1870)
Distribution: Makira (= San Cristobal) & Owaraha (= Santa Anna) islands (Solomon Islands).
Endemism: geographical & regional endemic.
Number of localities: 2 (post-1990).
Habitat: unknown.
Altitude zone: montane areas.
IUCN assessment: Data Deficient.

Palaina (s. l.) *yamdena* sp. nov.
Distribution: Yamdena Island (Tanimbar Islands).
Endemism: geographical & regional endemic, ? site endemic.
Number of localities: 1 (post-1990).
Habitat: primary lowland rainforests on limestone.
Altitude zone: lowlands.
IUCN assessment: Data Deficient.

Chirality

As stated by Clements et al. (2008) and other authors, gastropod shells generally exhibit logarithmic spiral growth, coiling, usually dextrally around a single axis. The shell is secreted by the mantle edge, a soft elastic sheet of connective tissue covered by an epithelium (Wilbur 1964). Thus, a shell is essentially a petrified ontogeny of the aperture (the mantle edge) (Liew et al. 2014). Most of molluscs groups possess dextrally coiled shells. Several snail groups including the Diplommatinidae have both dextral and sinistral shells. Many diplommatinids are sinistral (especially those of *Palaina* O. Semper, 1865 where the majority of species are). Moreover, the Diplommatinidae have a third, unique chiral form, termed sinistroid, previously found only in the Oriental genus *Opisthosoma* Blanford et Blanford, 1860 (Clements et al. 2008; Webster et al. 2012). Sinistroid species start out dextrally coiling and reverse coiling direction during ontogeny forming a sinistral tuba on a dextral shell.

A particularly unusual species from the Raja Ampat Islands offshore of W New Guinea has one of the most uniquely coiled shells among all known molluscs. This species is placed in the genus *Moussonia* O. Semper, 1865 [3]. In this species (see description of *M. monstrificabilis* sp. nov. above) the first five whorls are dextral forming a broadly triangular shell. On the 5th whorl the shell's coiling direction is reversed resulting in what looks like a sinistral shell (sinistroid shell). The sinistral tuba (the whorls after the reversal in coiling direction) completely overgrows and obscures the initially dextral shell (Plate 29 figs 1-8). Since it was not possible to study the anatomy (e.g. radula) of this species because of a lack of technical equipment, it is not impossible *M. monstrificabilis* sp. nov. and its relatives represent a new (undescribed) genus as follows from their isolated position on a phylogenetic tree of caenogastropods (see the chapter "Phylogeny" below).

Among all known Diplommatinidae of the Papuan Region and Wallacea *Palaina* (s. l.) *angulata* O. Boettger, 1891 is the only species known to have both dextral (prevalently) and sinistral (two specimens from Saparua Island, Lease Islands) shells.

A comparison of chiral diversity of the diplommatinids in this study summarized on Fig. 7 (also consider tables 4-5, 7, 9 & 11). Generally, all *Arinia* in the study area are dextral (see note above about unclear status of this genus), all *Diancta* are sinistral, *Diplommatina* is 68% dextral and 32% sinistral, *Moussonia* are all dextral with one sinistroid species (8%), finally *Palaina* is predominantly sinistral (78%) with 22% dextral species and one dextral species with sinistral specimens. The case of *Palaina* is rather unique within molluscs since few other prevalently sinistral large groups are known. The reason why exactly this genus is so rich in sinistral species remains unknown.

Phylogeny

Originally, my work has no goal to provide DNA-based phylogenetic reconstruction. However, since alcohol-preserved material allowed DNA sequencing, some additional information was available to include to the present revision and is presented below.

The first molecular phylogenetic reconstruction of the Diplommatinidae was undertaken by Webster et al. (2012) and based on five genes and 2700 bp. It was integrated with ancestral state reconstruction and phylogenetic PCA of discrete and quantitative traits. Webster et al. (2012) found support for the SE Asian Diplommatinidae as a monophyletic group and raised the rank of the Cochlostomatidae as a family. According to his study, five main clades appear within the Diplommatinidae, corresponding with both coiling direction and biogeographic patterns.

Relations between Lesser Sunda and Central Moluccan species is rather obvious (*Palaina an-*

3 Phylogenetic information is not available for other *Moussonia* species, as a result, my placement of aforementioned species into this genus is based exclusively on conchological characters. Phylogenetically *M. monstrificabilis* sp. nov. is closely related to Papuan *M. separanda* sp. nov.






gulata, P. ascendens, P. manggaraica) since these species represent same clade.

Clade E of Webster (2012) in the study area represented at least by *Diplommatina baliana*, a species from Java and W Lesser Sunda Islands.

Raja Ampat Islands species *Palaina attenboroughi*, *P. bicornis*, *P. hartmanni*, *P. megalostoma* are representing at least three clusters, one for species from Waigeo and two - for species from Misool.

Diancta constricta demonstrates phylogenetic distance of North Moluccan clade.

The most peculiar is the relationship of two species from Misool I currently arranged to *Moussonia - M. monstrificabilis* and *M. separanda*. Results show position of these two species either closely related to Alycaeinae of the Cochlostomatidae rather than to any known Diplommatinidae. At this point, I am not able to explain their position within the tree of Caenogastropoda. COI is a relatively rapidly evolving gene and while it is often good for elucidating species level relationships it is not that good at older divergences and it is likely the deeper level relationships may not be accurate (J. Slapcinsky, personal comment). In the future adding some more slowly evolving genes might resolve some of the deeper level nodes in the Diplommatinidae tree.

Arinia, Diancta, Diplommatina, Moussonia, and *Palaina* require revision to allow taxonomy to reflect phylogeny. Additional sequencing is highly welcome to clarify biogeographic patterns of newly appearing clades.

Sexual dimorphism

Diplommatinidae, like other caenogastropods have separate sexes that can be sexually dimorphic. Ribbing pattern and colour variation vary among specimens of both sexes and not specifically in males or females. Female shells are generally more obese than those of males (Figs 98 & 105a-b), but these size differences are slight and not measurable in mm scale but in µm. For example, in *Palaina iha*, female is 300 µm wider than male and in *P. lengguru*, females are 250-350 µm wider than males.

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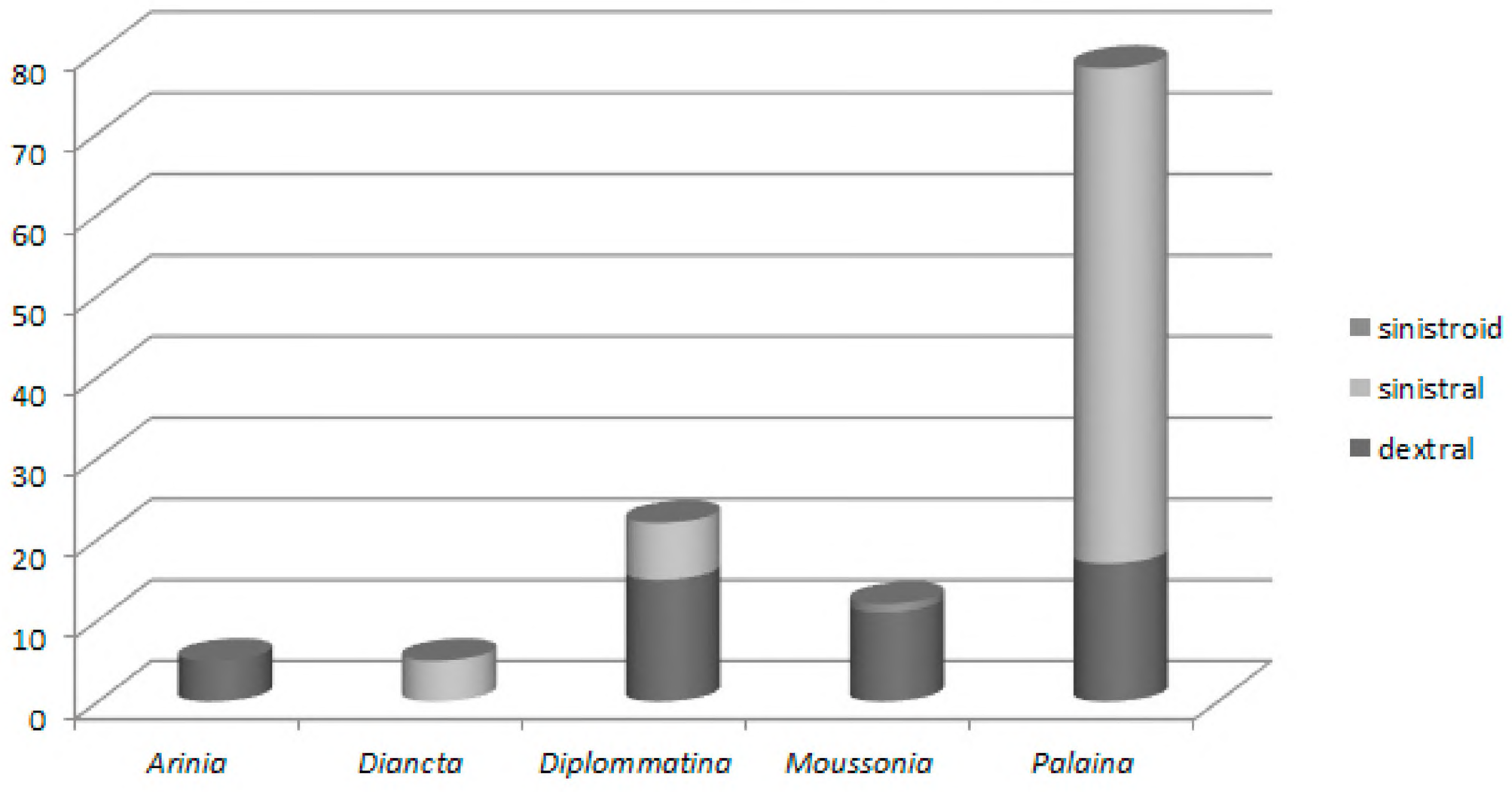


Figure 7. Chiral diversity among the Wallacean and Papuan Diplommatinidae. Legends: x axis - Diplommatinidae genera, y axis - number of species.






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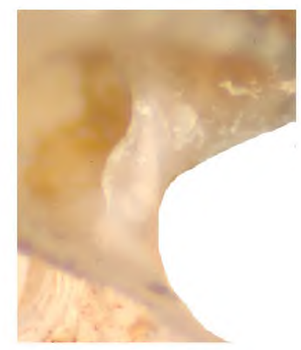
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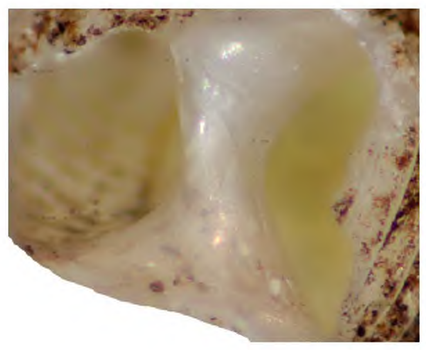
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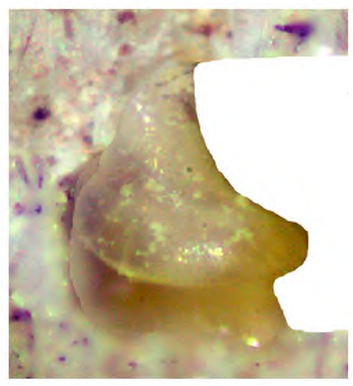
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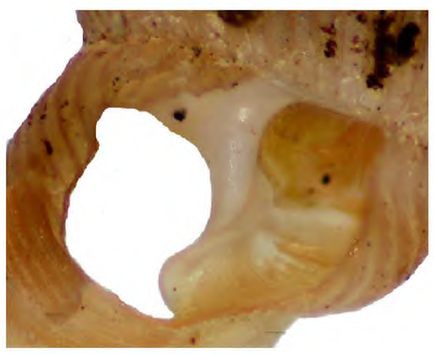
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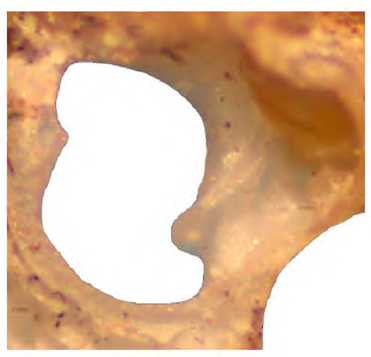
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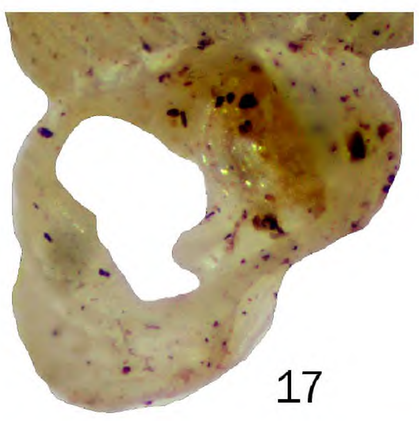
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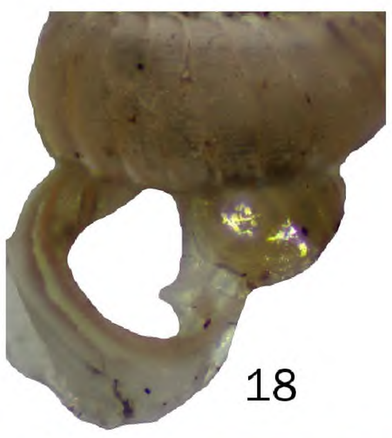
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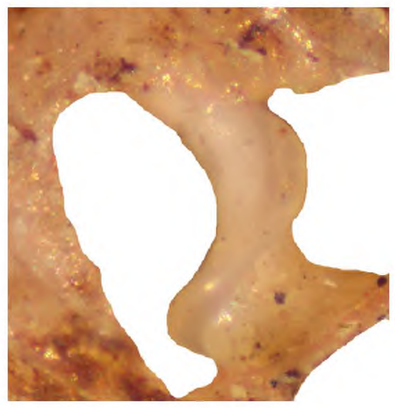
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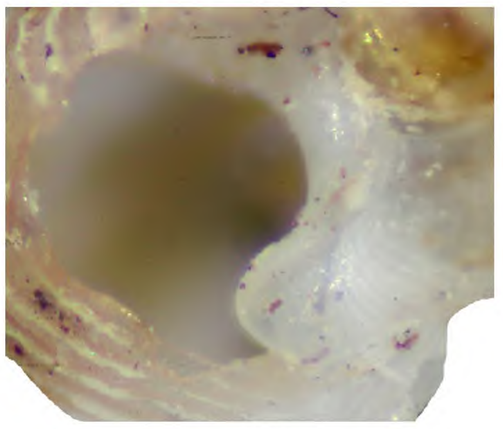
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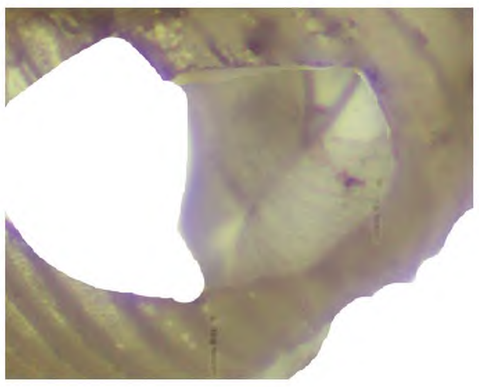
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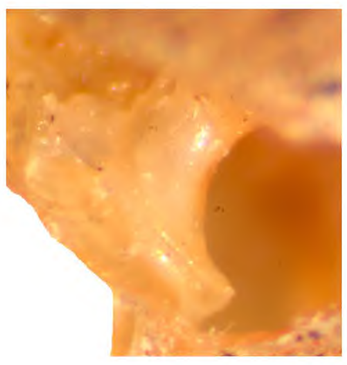
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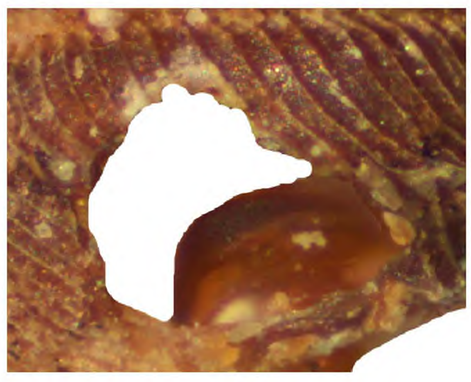
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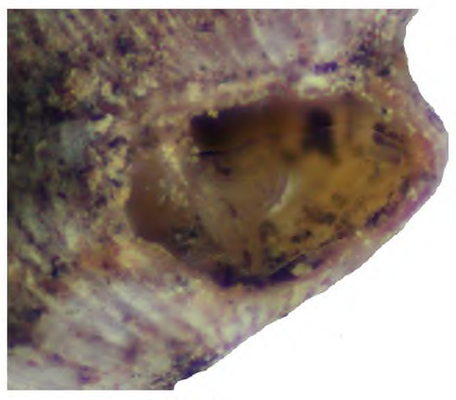
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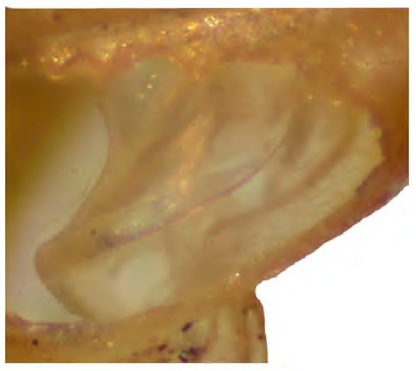
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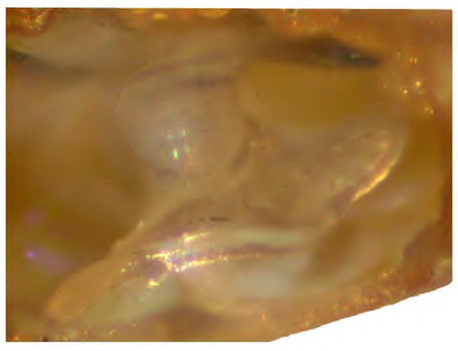
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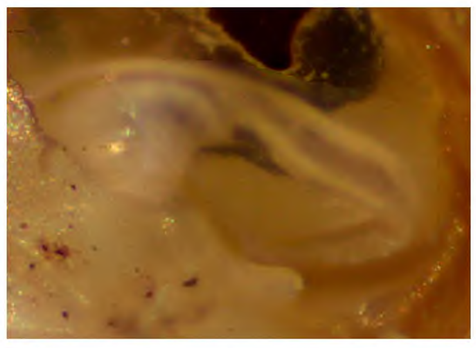
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Figures 8-30. Internal lamellae of the Papuan and Wallacean Diplommatinidae. 8 – *Diancta constricta* (Martens, 1864); 9 – *D. halmaherica* sp. nov.; 10 – *D. obiensis* sp. nov.; 11 – *Diplommatina fluminis* B. Rensch, 1931; 12 – *D. javana* von Möllendorff, 1897; 13 – *D. floris* B. Rensch, 1931; 14 – *D. jonabletti* sp. nov.; 15 – *D. mertoni* C.R. Boettger, 1922; 16 – *D. patani* sp. nov.; 17-18 – *D. radiiformis* Preston, 1913; 19 – *D. slapcinskyi* sp. nov.; 20 – *D. symmetrica* Hedley, 1891; 21 – *D. telnovi* sp. nov.; 22 – *D. timorensis* sp. nov.; 23-24 – *D. waigeoensis* sp. nov.; 25 – *Moussonia manuselae* sp. nov.; 26-27 – *M. papuana* (Tapparone Canefri, 1883); 28-30 – *M. pseudoseparanda* sp. nov.

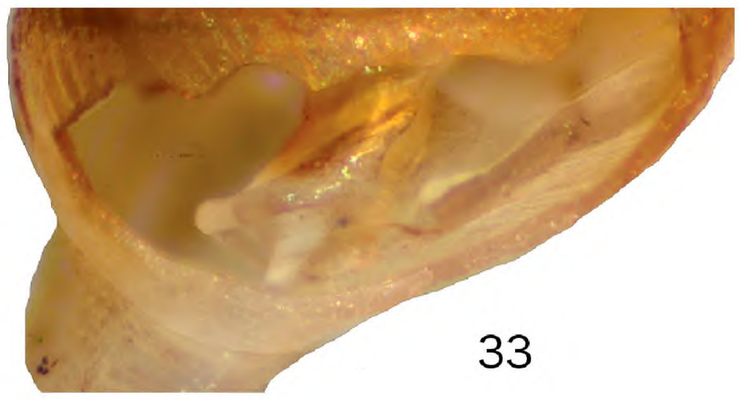




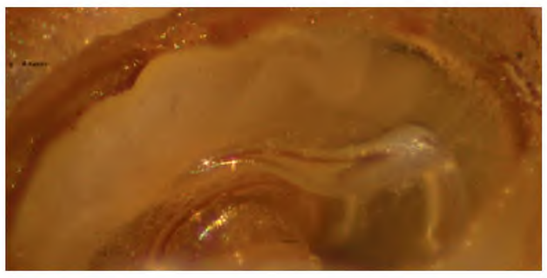
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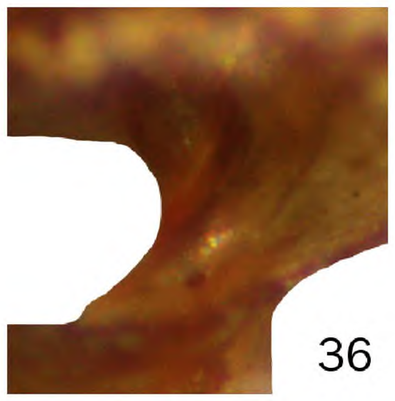
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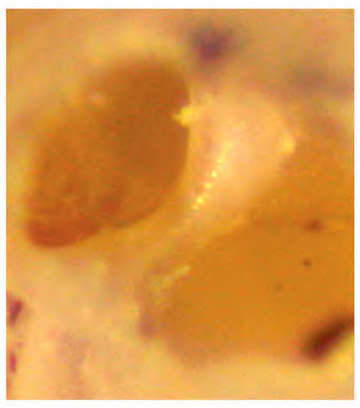
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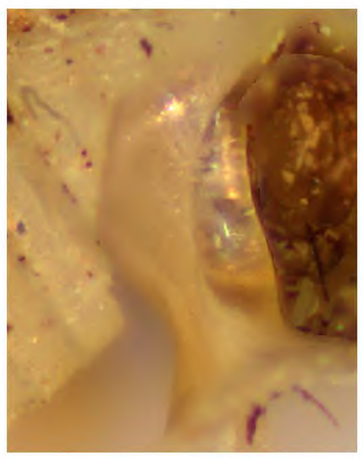
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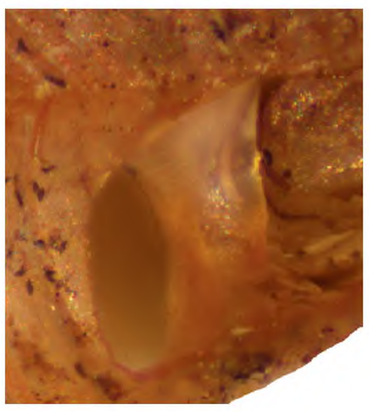
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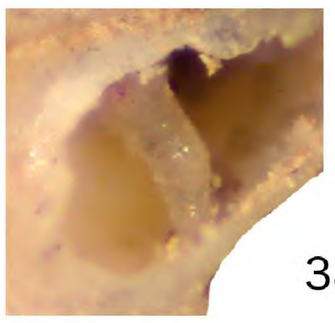
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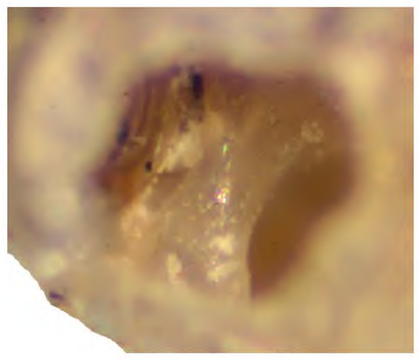
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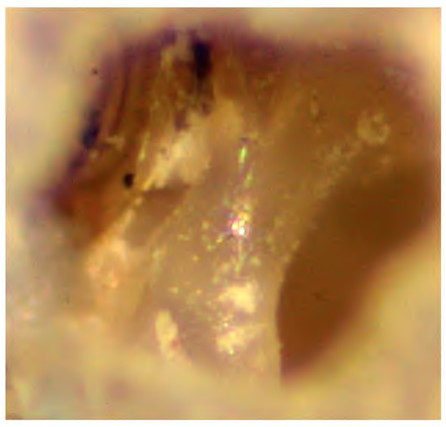
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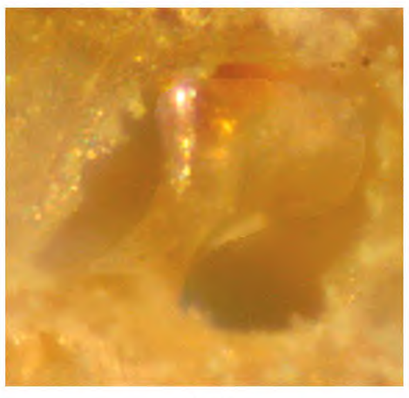
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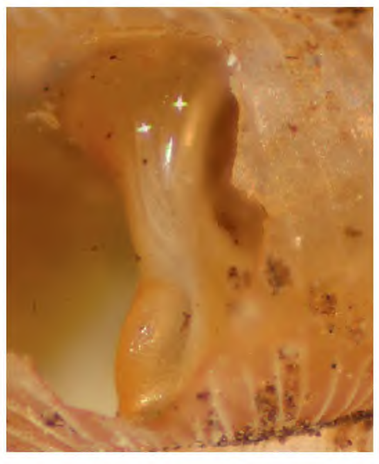
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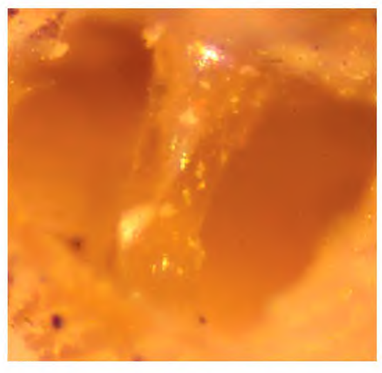
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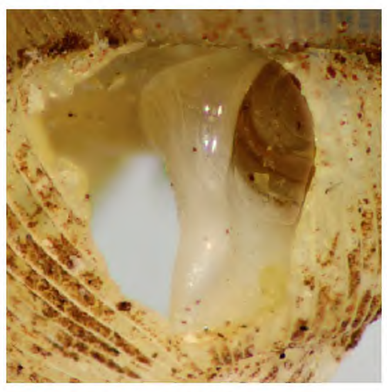
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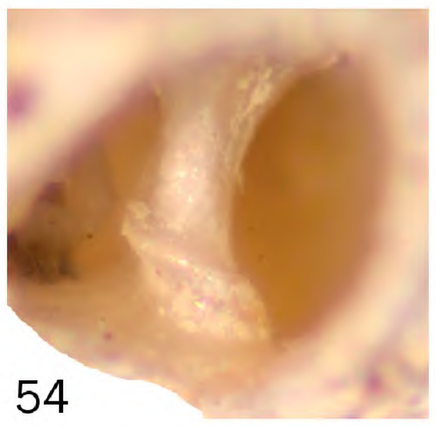
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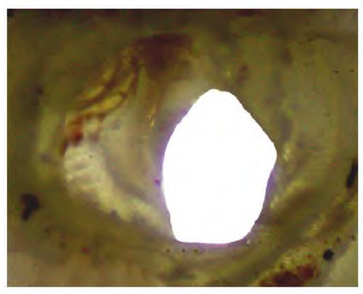
Figures 31-54. Internal lamellae of the Papuan and Wallacean Diplommatinidae. 31-34 – *Moussonia separanda* sp. nov.; 35-36 – *M. torricelli* sp. nov.; 37-38 – *Arinia tjendanae* B. Rensch, 1931; 39 – *Palaina albrechti* sp. nov.; 40-42 – *P. angulata* O. Boettger, 1891; 43 – *P. ascendens* (Martens, 1864); 44-45 – *P. attenboroughi* sp. nov.; 46-47 – *P. bicornis* van Benthem Jutting, 1958; 48 – *P. biroi* Soós, 1911; 49 – *P. bougainvillei* sp nov.; 50-51 – *P. chrysostoma* E.A. Smith, 1897; 52 – *P. carbavica* O. Boettger, 1891; 53 – *P. doberai* sp. nov.; 54 – *P. commixta* I. Rensch, 1937.



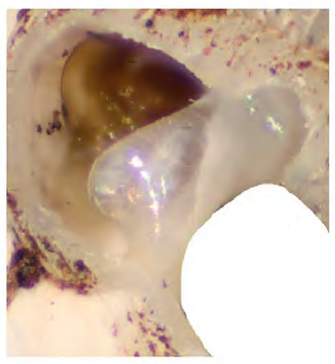




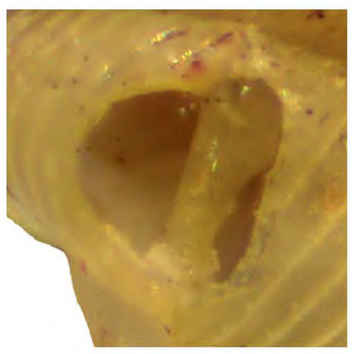




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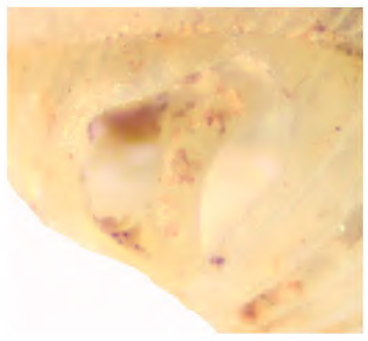
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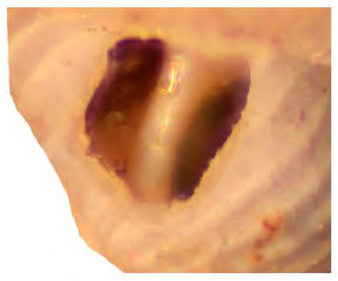
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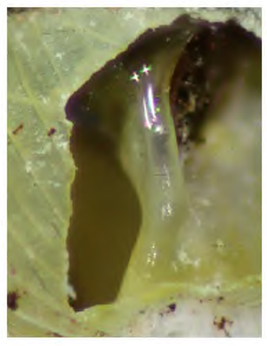
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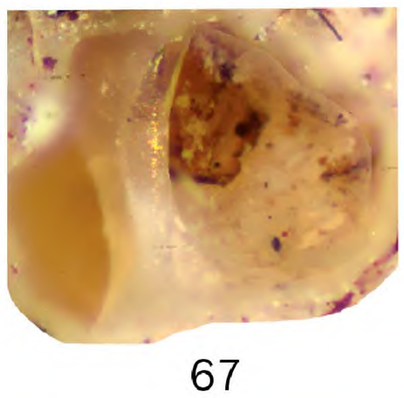
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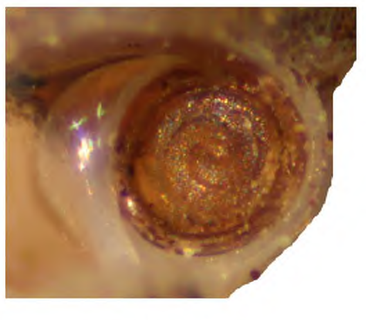
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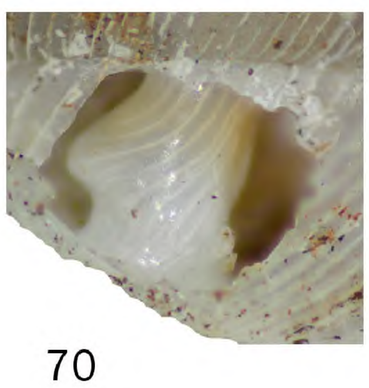
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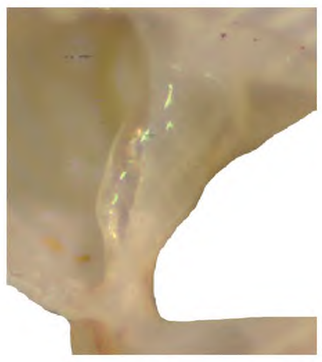
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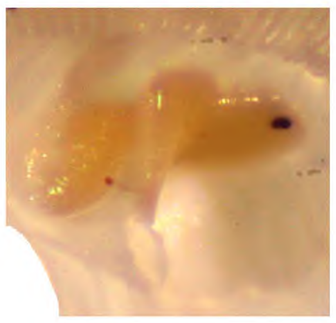
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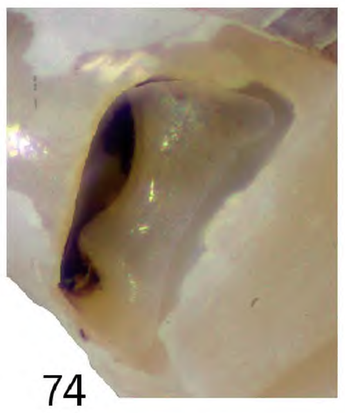
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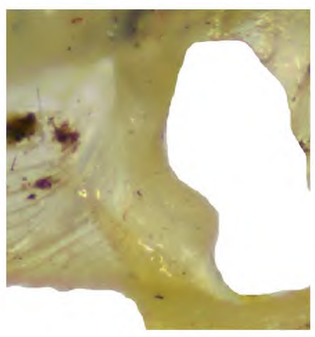
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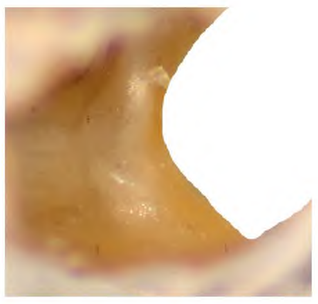
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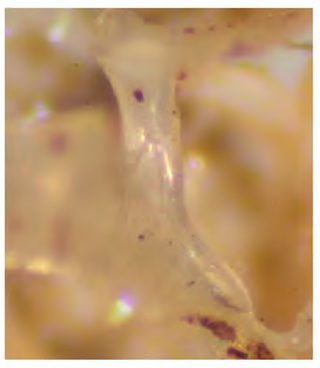
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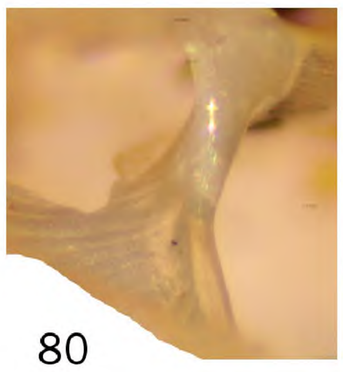
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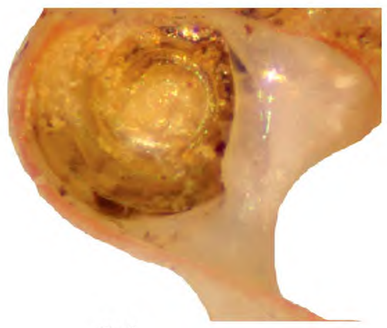
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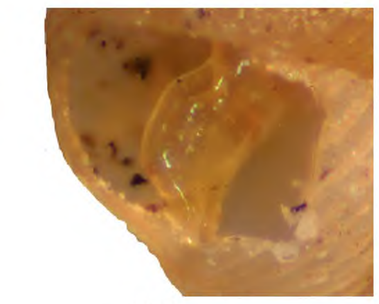
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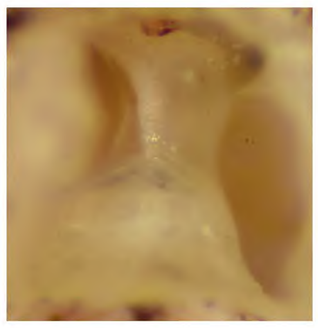
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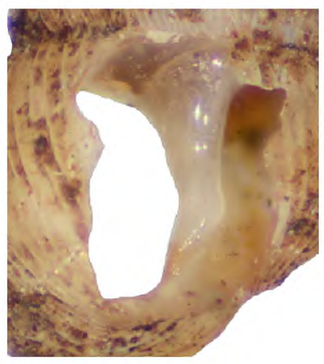
Figures 55-84. Internal lamellae and opercula of the Papuan and Wallacean Diplommatinidae. 55 – *Palaina dohertyi* E.A. Smith, 1897; 56 – *P. extremita* sp. nov.; 57 – *P. flavocylindrica* sp. nov.; 58 – *P. hartmanni* sp. nov.; 59 – *P. louisiade* sp. nov.; 60 – *P. iha* sp. nov.; 61 – *P. imperfecta* sp. nov.; 62 – *P. insulana* sp. nov.; 63 – *P. laszloi* sp. nov.; 64 – *P. novoguineensis* E.A. Smith, 1897; 65-66 – *P. lengguru* sp. nov.; 67 – *P. mairasi* sp. nov.; 68-69 – *P. manggaraica* (E.A. Smith, 1897); 70 – *P. megalostoma* sp. nov.; 71 – *P. mengen* sp. nov.; 72 – *P. minuscularia* sp. nov.; 73-74 – *P. mirifica* sp nov.; 75-76 – *P. misoolensis* sp nov.; 77 – *P. mutis* sp nov.; 78 – *P. novopommerana* I. et B. Rensch, 1929; 79 – *P. obiensis* sp nov.; 80 – *P. onin* sp nov.; 81 – *P. papuamontis* sp nov.; 82 – *P. paradisaea* sp nov.; 83-84 – *P. perspectiva* sp nov..



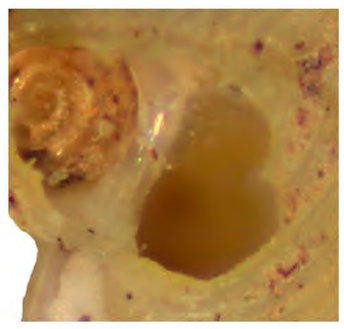




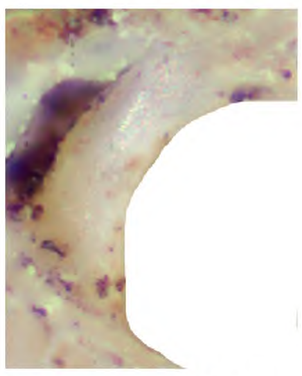




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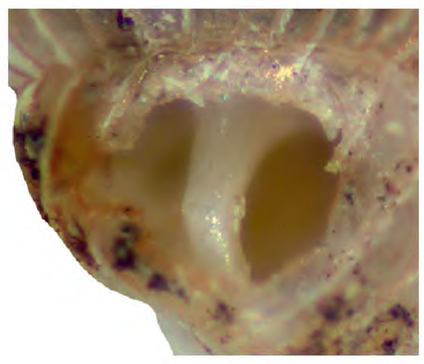
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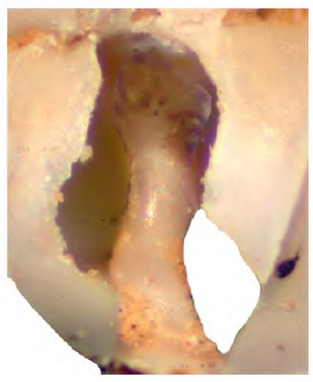
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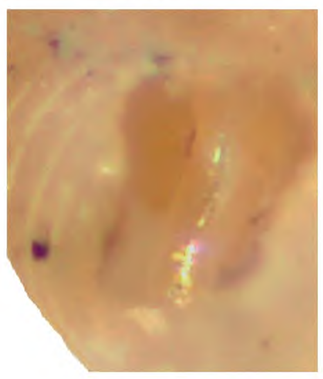
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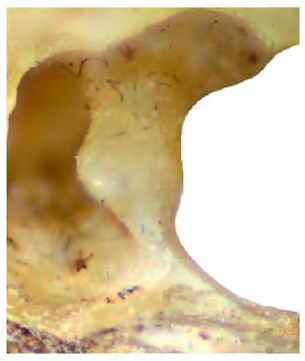
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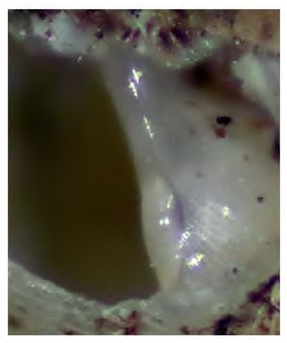
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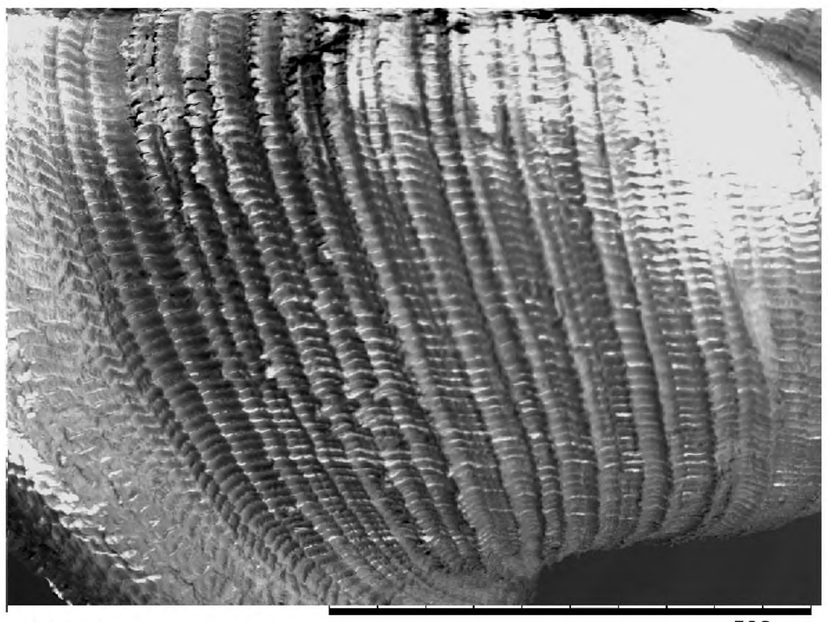
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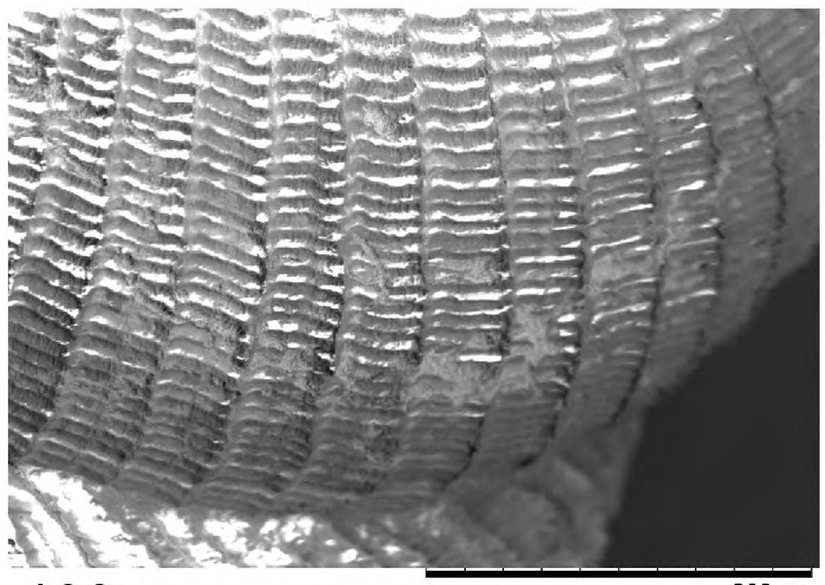
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Figures 85-107. Internal lamellae and shell outline of the Papuan and Wallacean Diplommatinidae. 85 & 98 – *Palaina polystoma* B. Rensch, 1931; 86 – *P. psittricha* sp. nov.; 87 – *P. silvicultrix* sp. nov.; 88 – *P. slapcinskyi* sp. nov.; 89 – *P. sparselamellata* sp. nov.; 90 – *P. tanimbarensis* sp. nov.; 91 – *P. telnovi* sp. nov.; 92 – *P. thomasrinteleni* sp. nov.; 93 – *P. vermeuleni* sp. nov.; 94-95 – *P. waigeo* sp nov.; 96 – *P. wawiyai* sp. nov.; 97 – *P. yamdena* sp. nov; 99a & b – *P. angulata* O. Boettger, 1891 (a – female, b – male); 100 – *P. iha* sp. nov.; 101 – *P. lengguru* sp. nov.; 102 – *P. albrechti* sp. nov.; 103 – *P. waigeo* sp. nov.; 104 – *P. lengguru* sp. nov.; 105a & b – *Arinia tjendanae* B. Rensch, 1931 (a – male, b – female); 106 – Peristome width in *P. iha* sp. nov.; 107 – ditto, *P. albrechti* sp. nov.

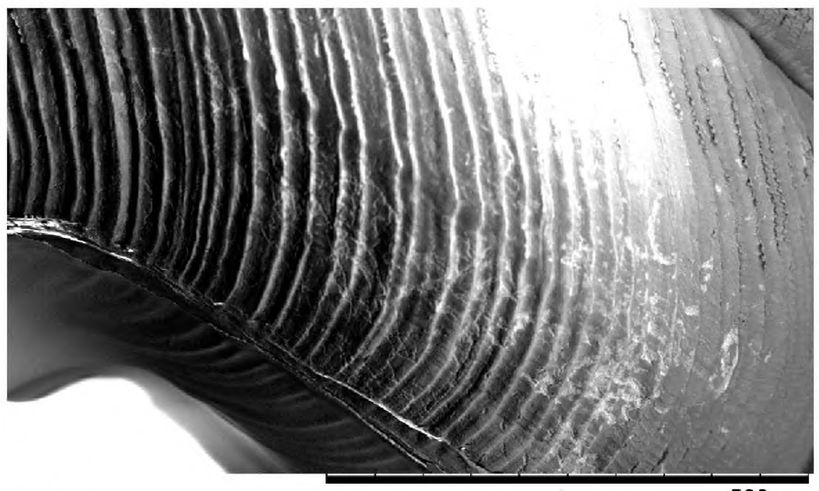
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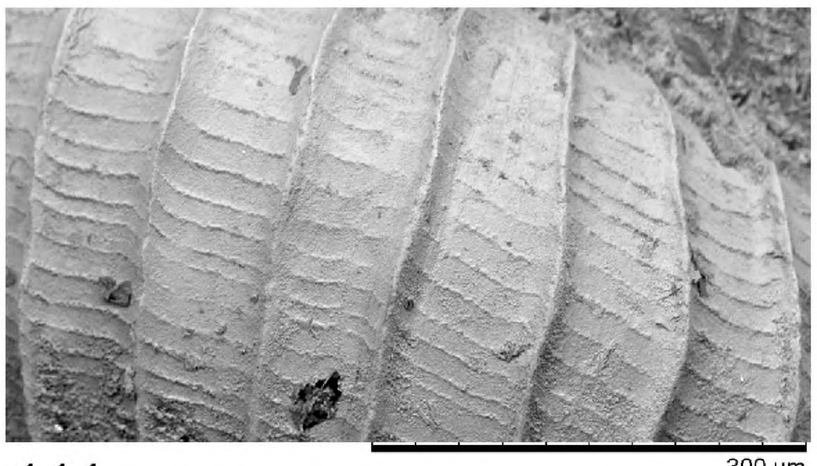
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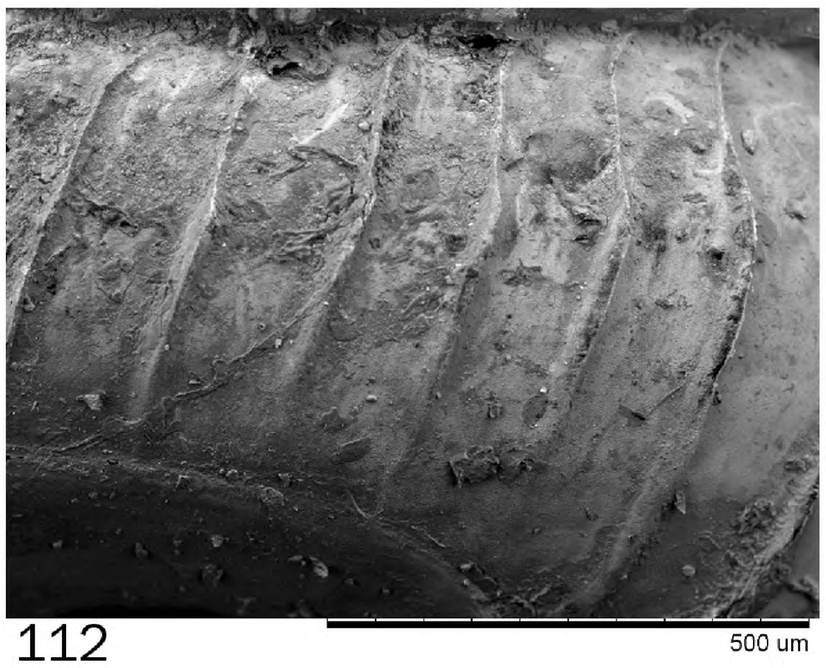
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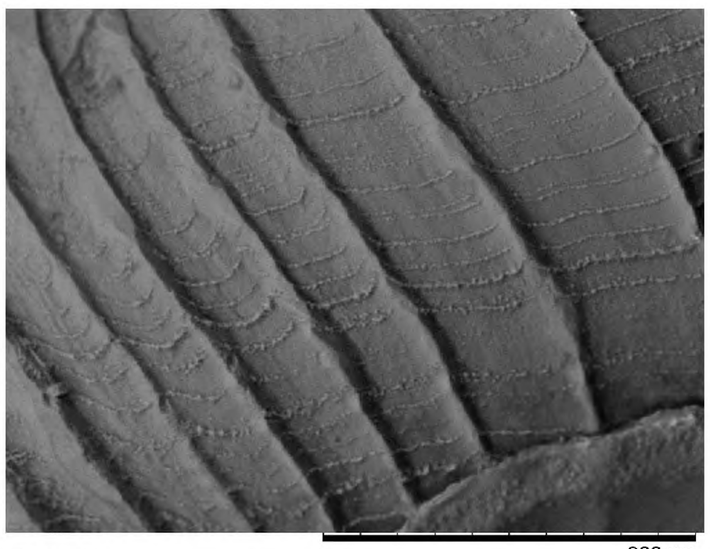
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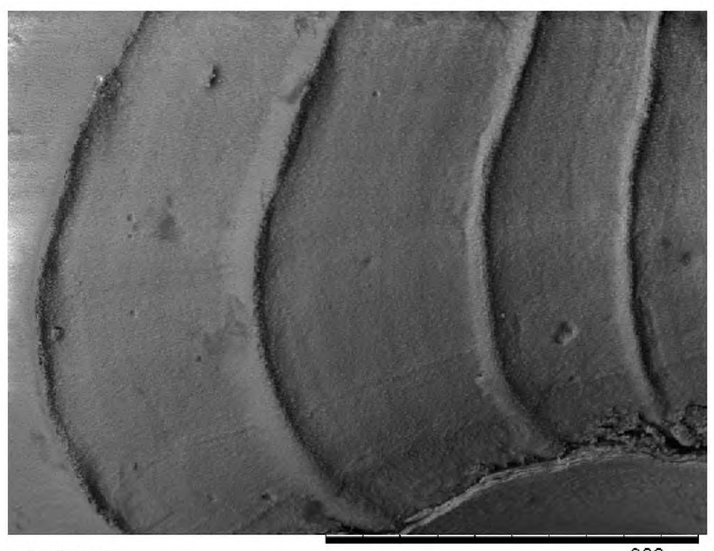
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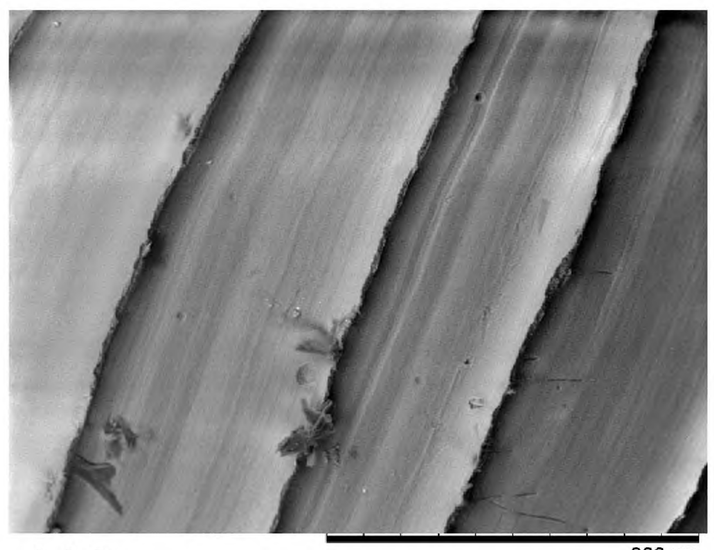
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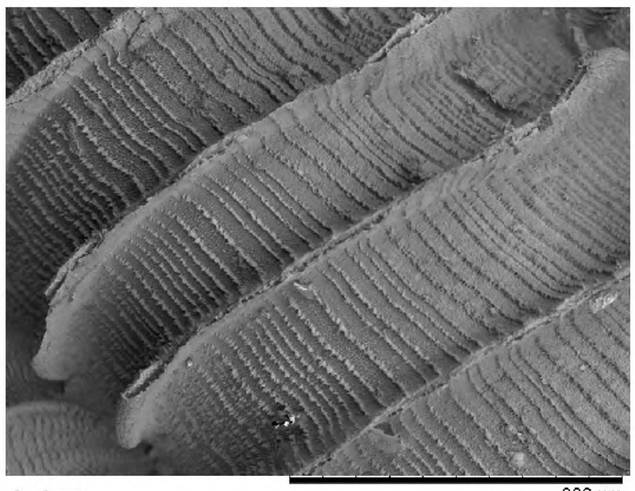
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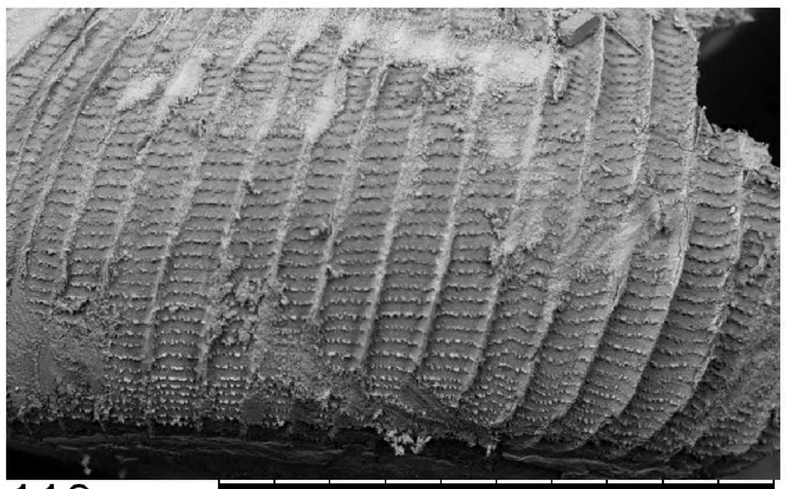
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Figures 108-116. Micrographs of the Papuan and Wallacean Diplommatinidae. 108-109 – *Moussonia monstrificabilis* sp. nov. (200x & 400x magnification); 110 – *M. separanda* sp. nov. (200x); 111 – *Diplommatina radiiformis* Preston, 1913 (300x); 112 – *D. floresiana* E.A. Smith, 1897 (200x); 113 – *D. jonabletti* sp. nov. (200x); 114 – *Palaina angulata* O. Boettger, 1891 (300x); 115 – *P. silvicultrix* sp. nov. (300x); 116 – *P. wawiyai* sp. nov. (300x).



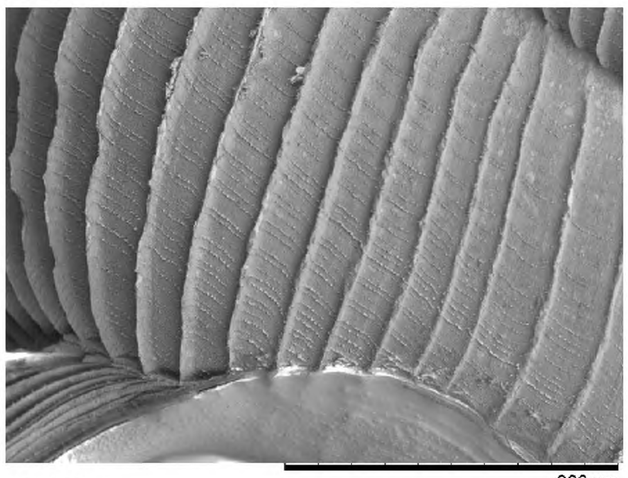


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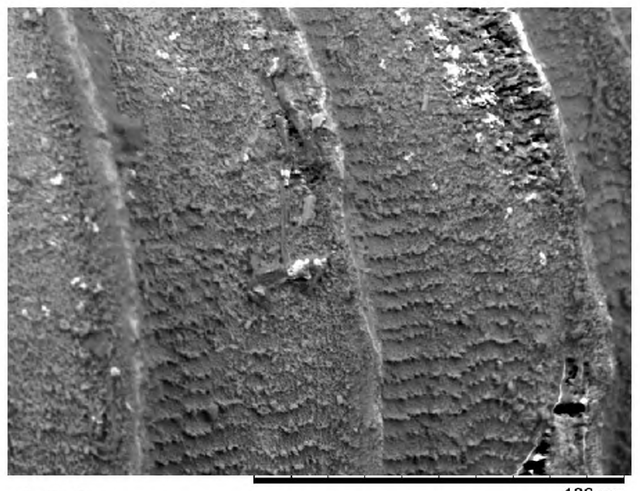


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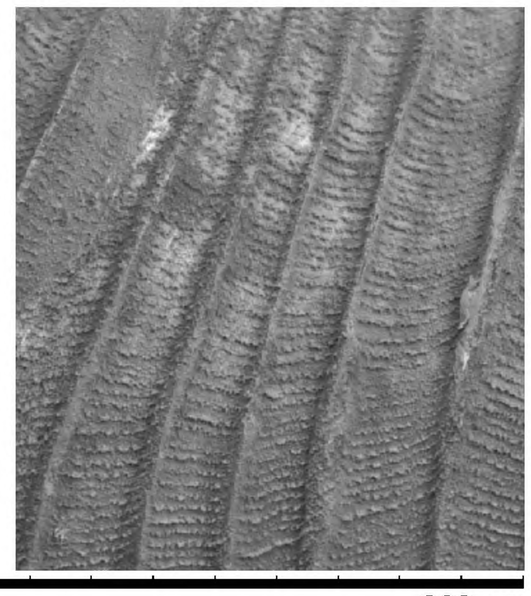
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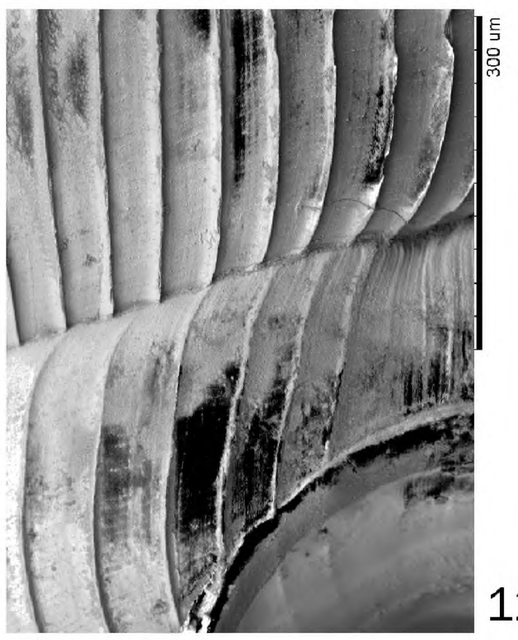


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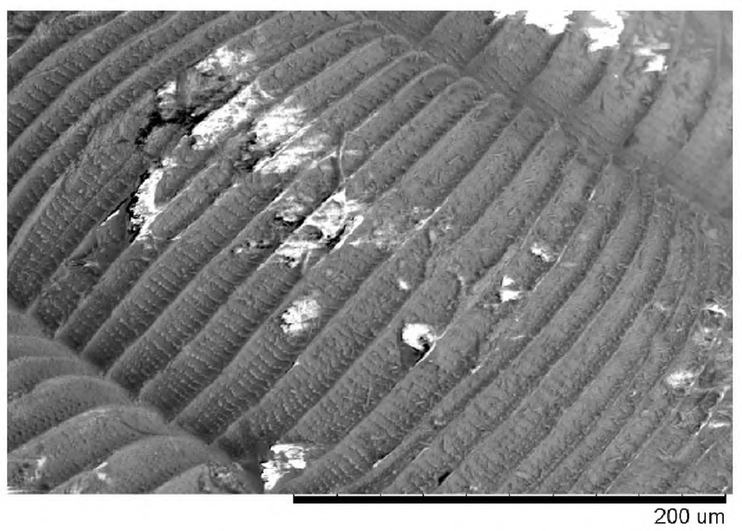




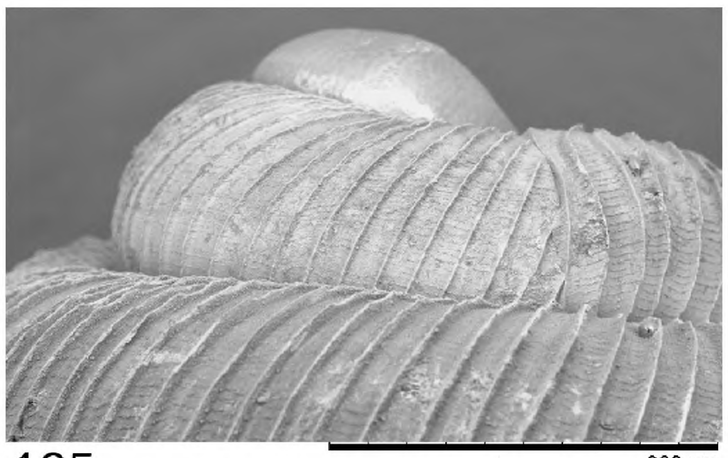
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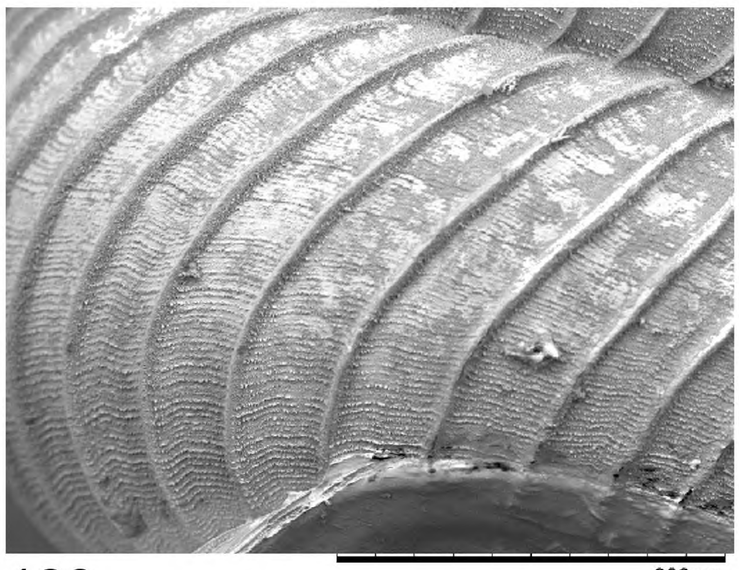
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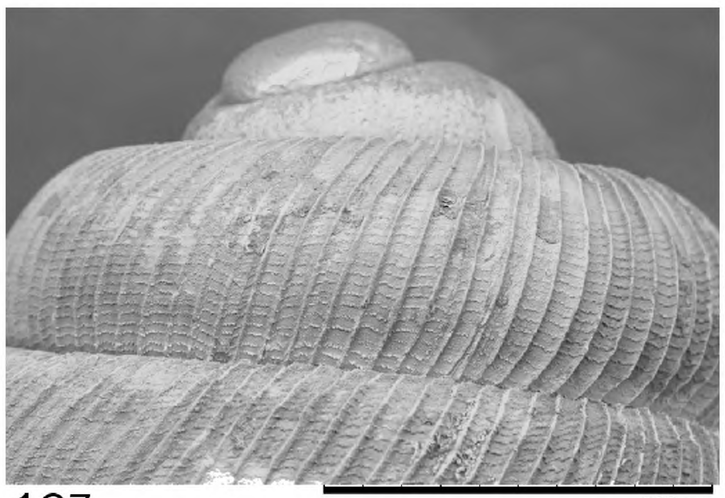
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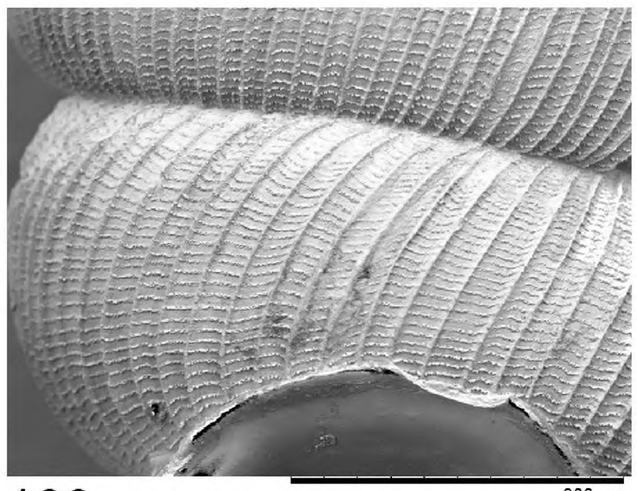
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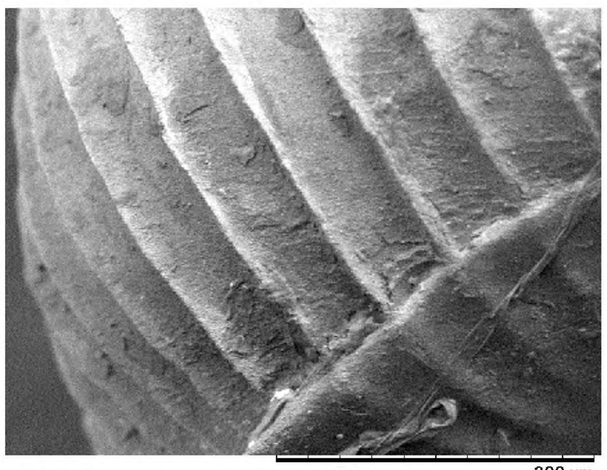
Figures 117-128. Micrographs of the Papuan and Wallacean Diplommatinidae. 117 – *Palaina attenboroughi* sp. nov. (300x magnification); 118 – *P. biroi* Soós, 1911 (300x); 119-120 – *P. carbavica* O. Boettger, 1891 (300x & 1000x); 121 – *P. flavocylindrica* sp. nov. (500x); 122-123 – *P. hartmanni* sp. nov. (300x); 124 – *Palaina iha* sp. nov. (500x); 125-126 – *P. insulana* sp. nov. (300x); 127-128 – *P. minuscularia* sp. nov. (300x).



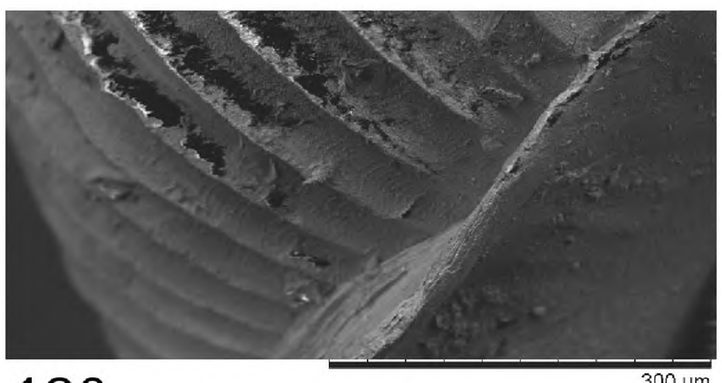




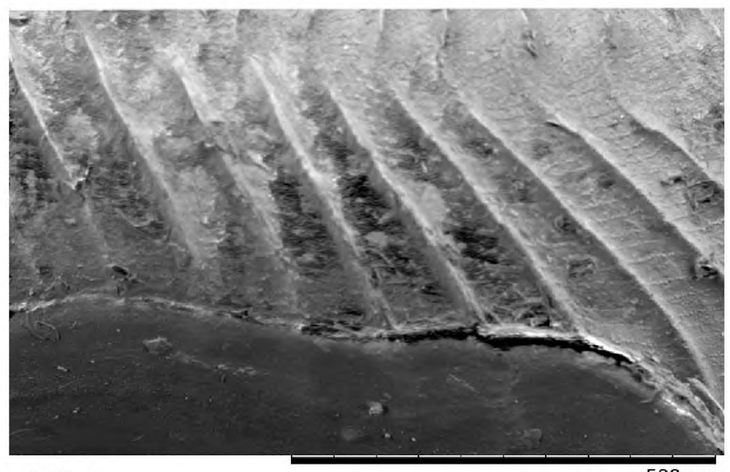




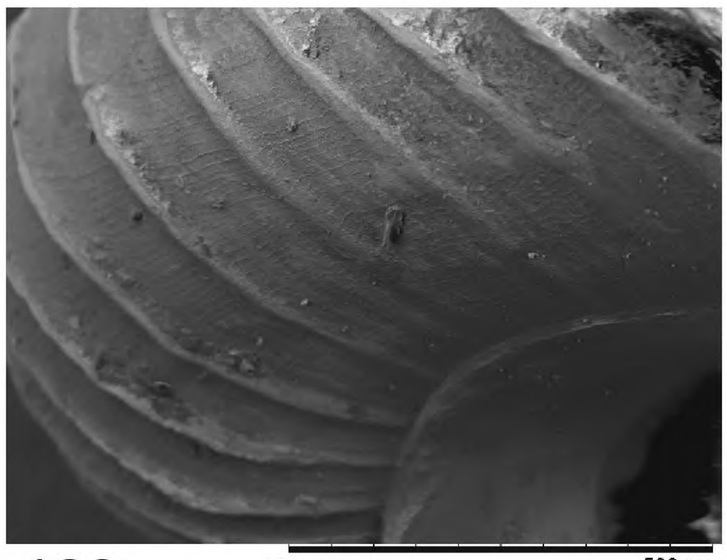
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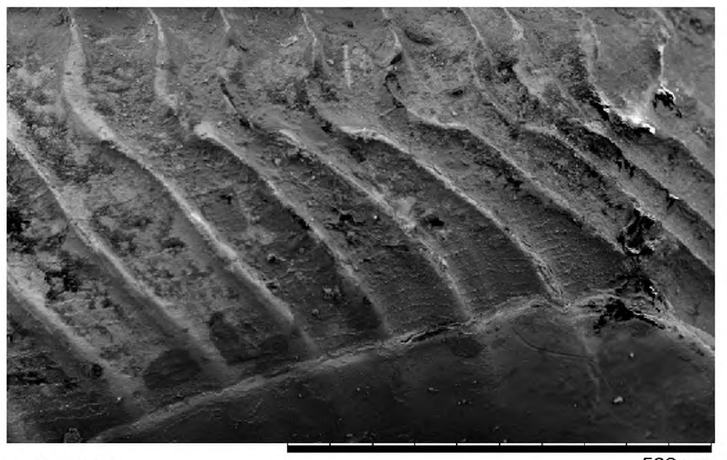
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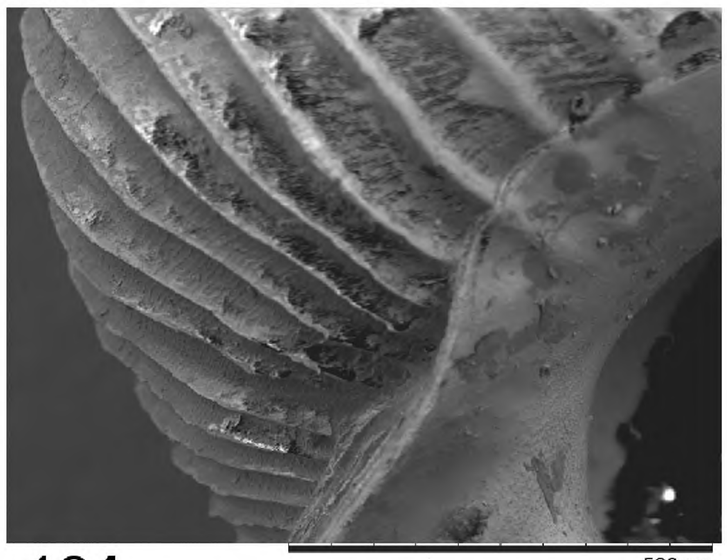
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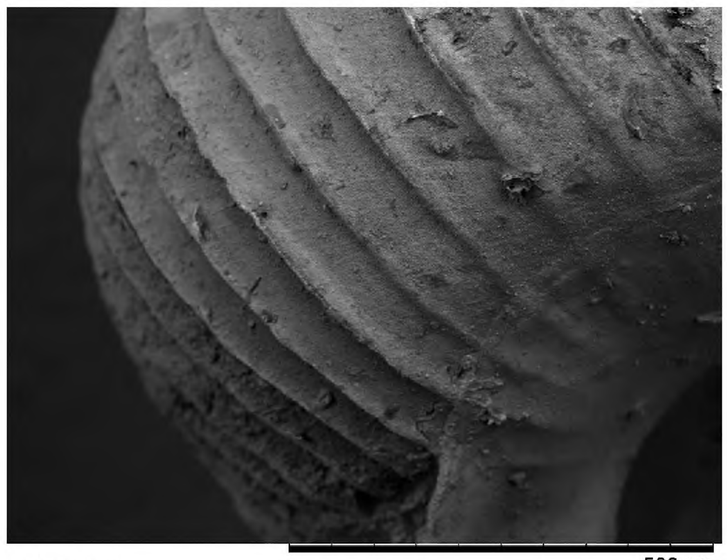
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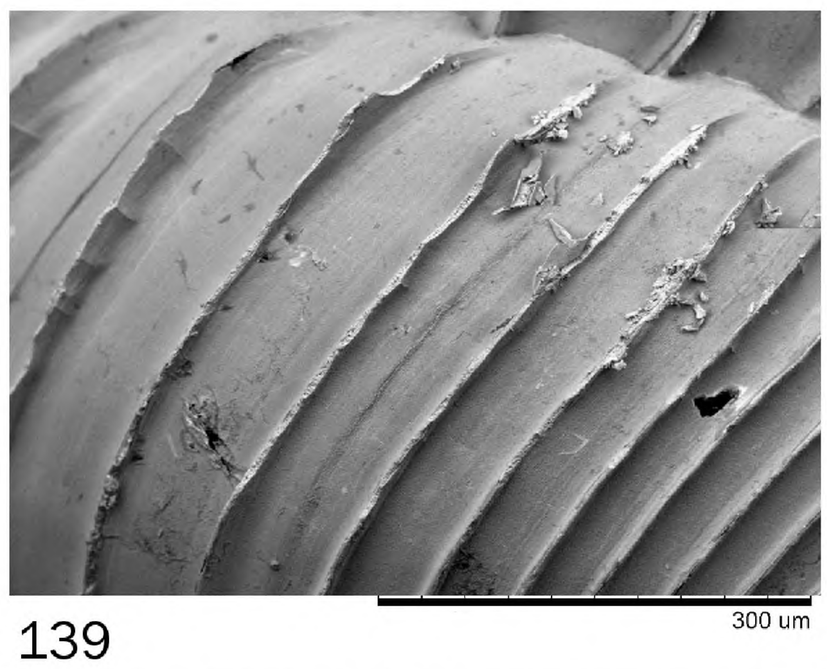
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Figures 129-137. Micrographs of the Papuan and Wallacean Diplommatinidae. 129-131 – *Diplommatina mertoni* C.R. Boettger, 1922 (300x magnification); 132-135 – *D. telnovi* sp. nov. (200x); 136 – *D. symmetrica* Hedley, 1891 (300x); 137 – *Palaina albrechti* sp. nov. (500x).





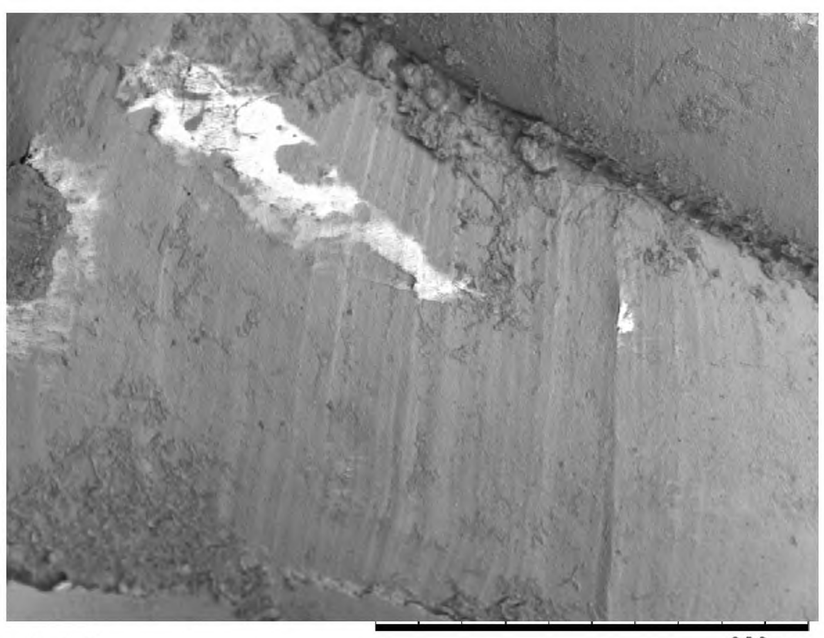
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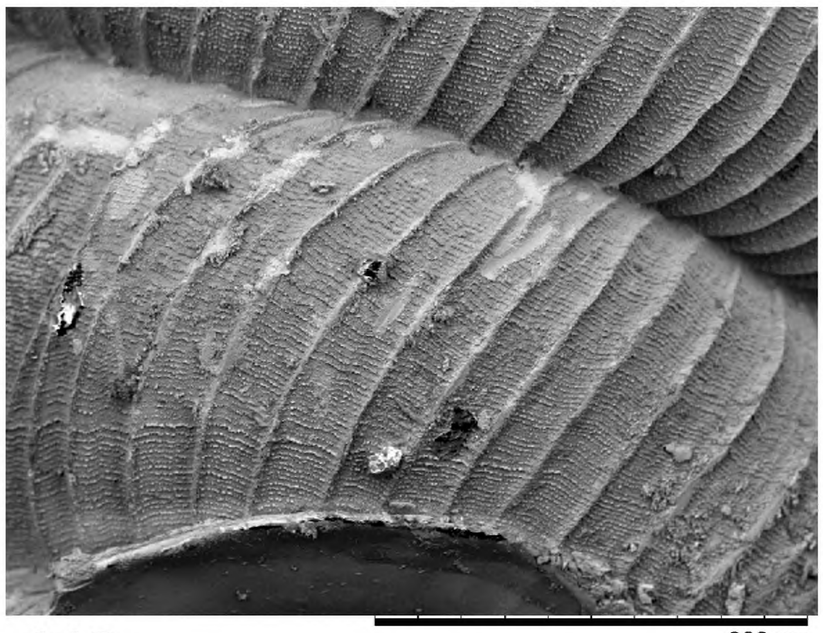
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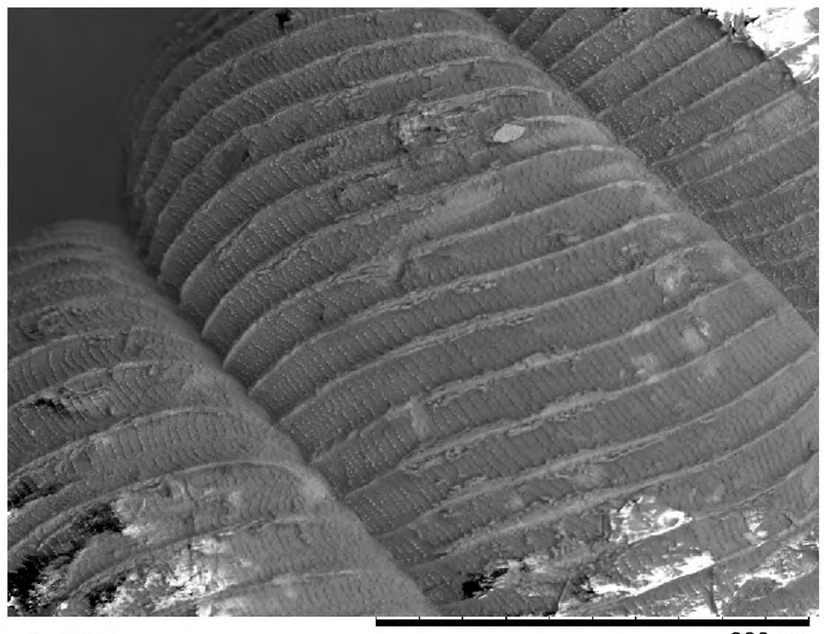
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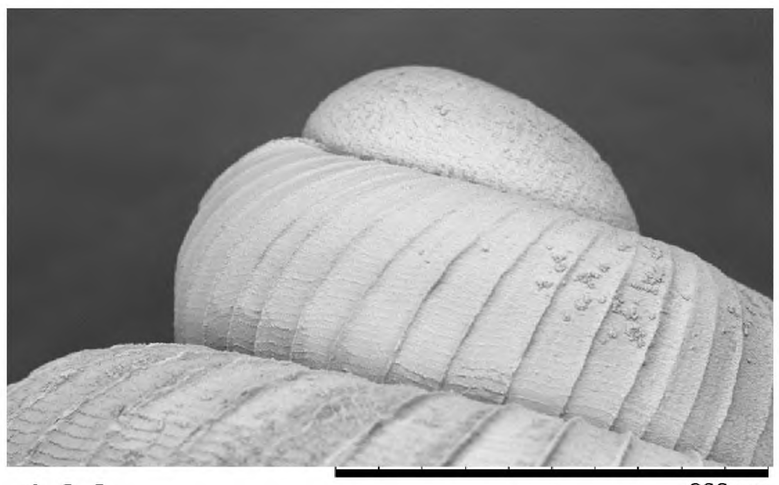
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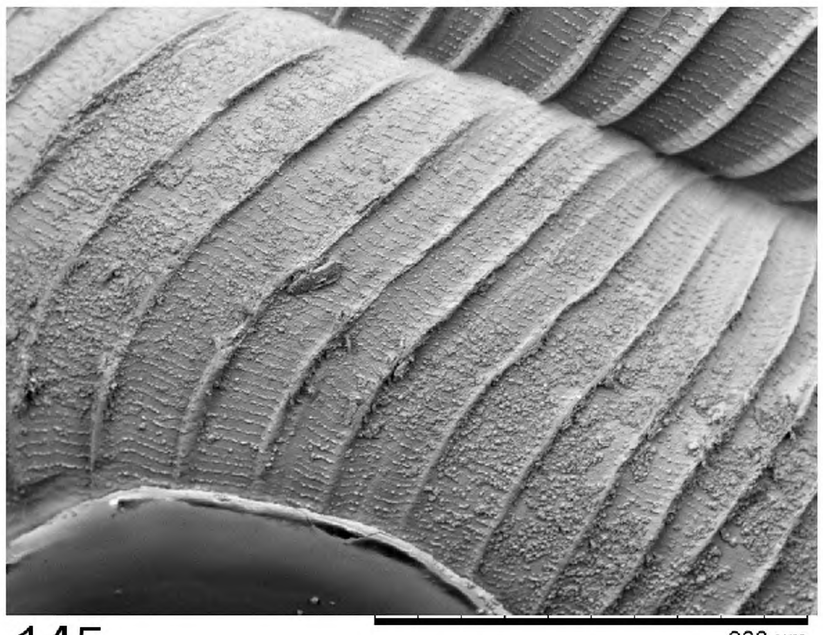
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Figures 138-145. Micrographs of the Papuan and Wallacean Diplommatinidae. 138-139 – *Palaina obiensis* sp. nov. (300x magnification); 140-141 – *Arinia tjendanae* B. Rensch, 1931 (300x); 142 – *P. psittricha* sp. nov. (300x); 143 – *P. waigeo* sp. nov. (300x); 144-145 – *P. yamdena* sp. nov. (300x).







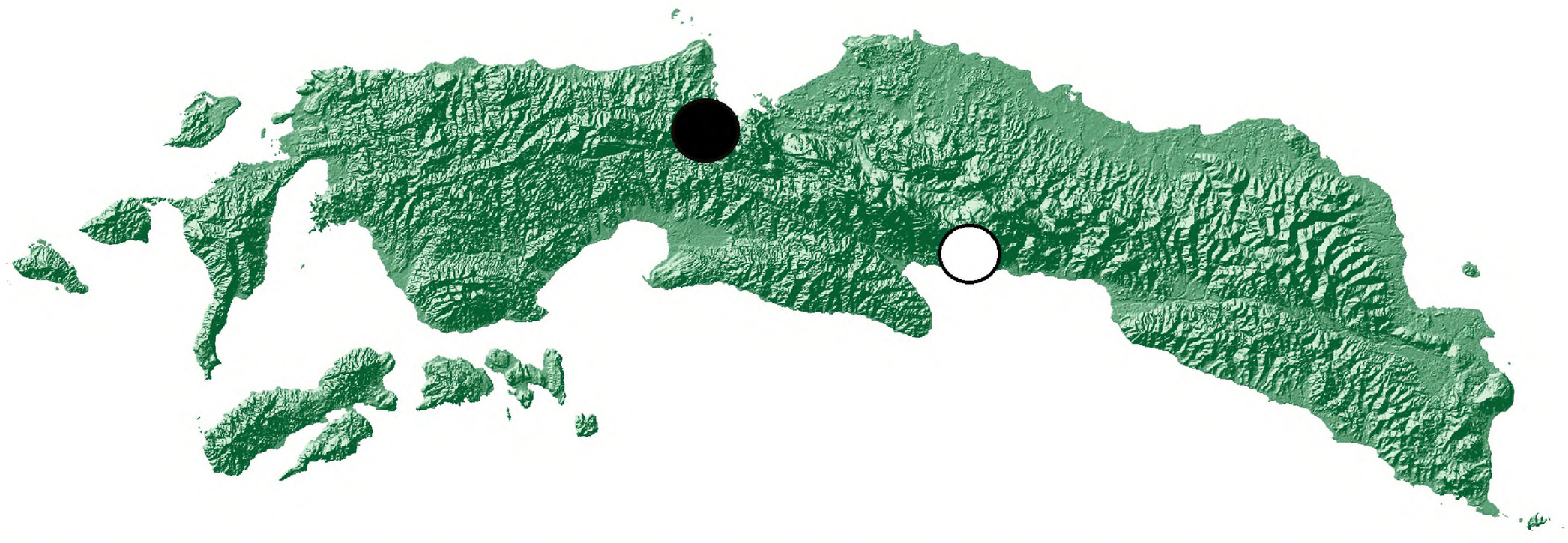




Map 5. Distribution of Diplommatinidae on North Moluccas. Circles – *Diancta* (s. str.) *constricta* (Martens, 1864); filled circles – *D.* (s. str.) *halmaherica* sp. nov.; squares – *D.* (s. str.) *obiensis* sp. nov.; filled square – *D.* (s. str.) *torta* O. Boettger, 1891; four-point star – *Diplommatina* (s. l.) *patani* sp. nov.; filled four-point stars – *D.* (s. l.) *radiiformis* Preston, 1913.

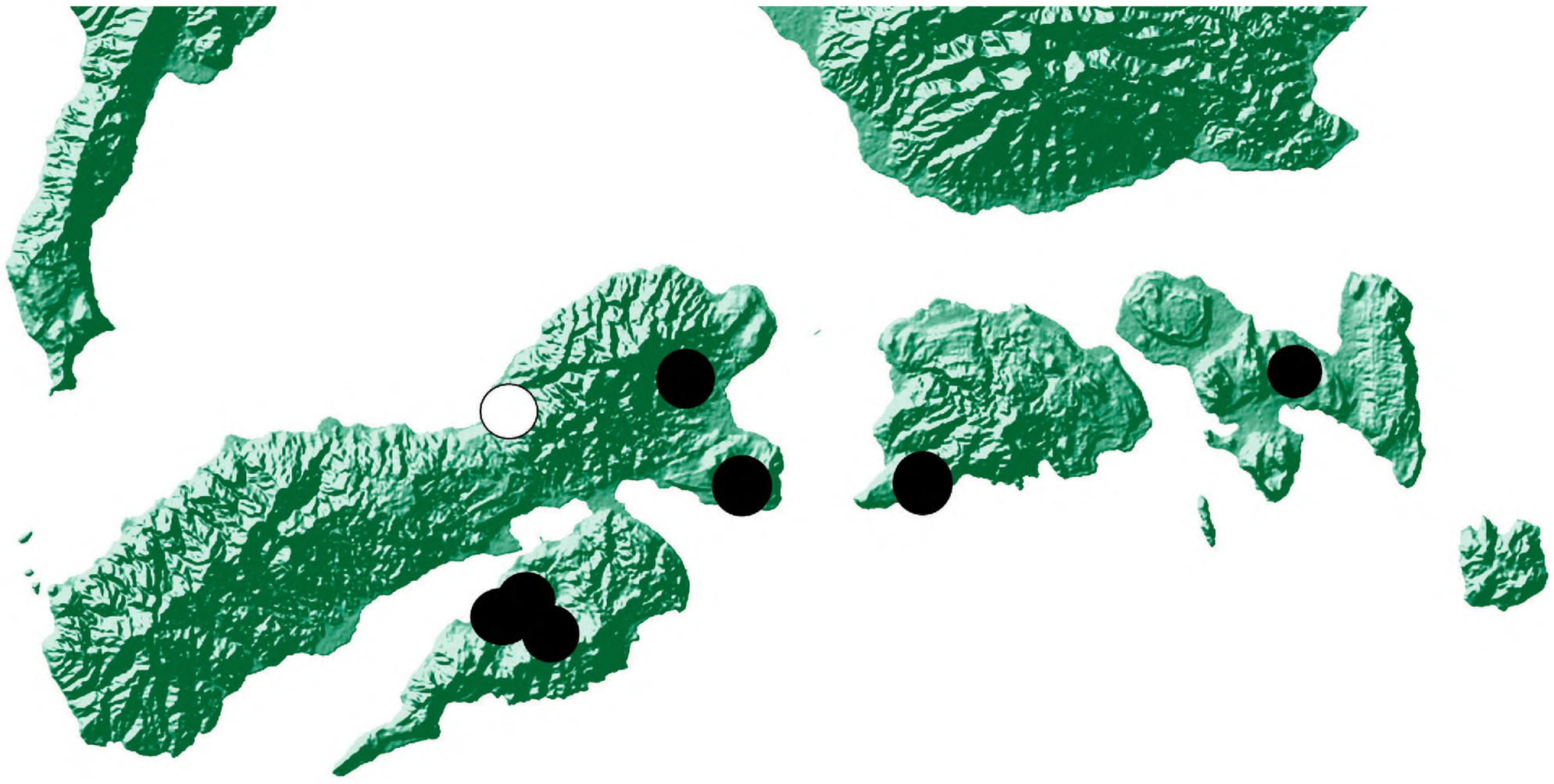


Map 6. Distribution of Diplommatinidae on North Moluccas. Circles – *Diplommatina* (s. l.) *moluccensis* sp. nov.; filled circle – *D.* (s. l.) *slapcinskyi* sp. nov. & *Palaina* (s. l.) *obiensis* sp. nov.; square – *P.* (s. l.) *minutula* sp. nov.; filled square – *Moussonia ahena* (Preston, 1913), *Palaina* (s. l.) *beilanensis* Preston, 1913 & *P.* (s. str.) *diepenheimi* (Preston, 1913).

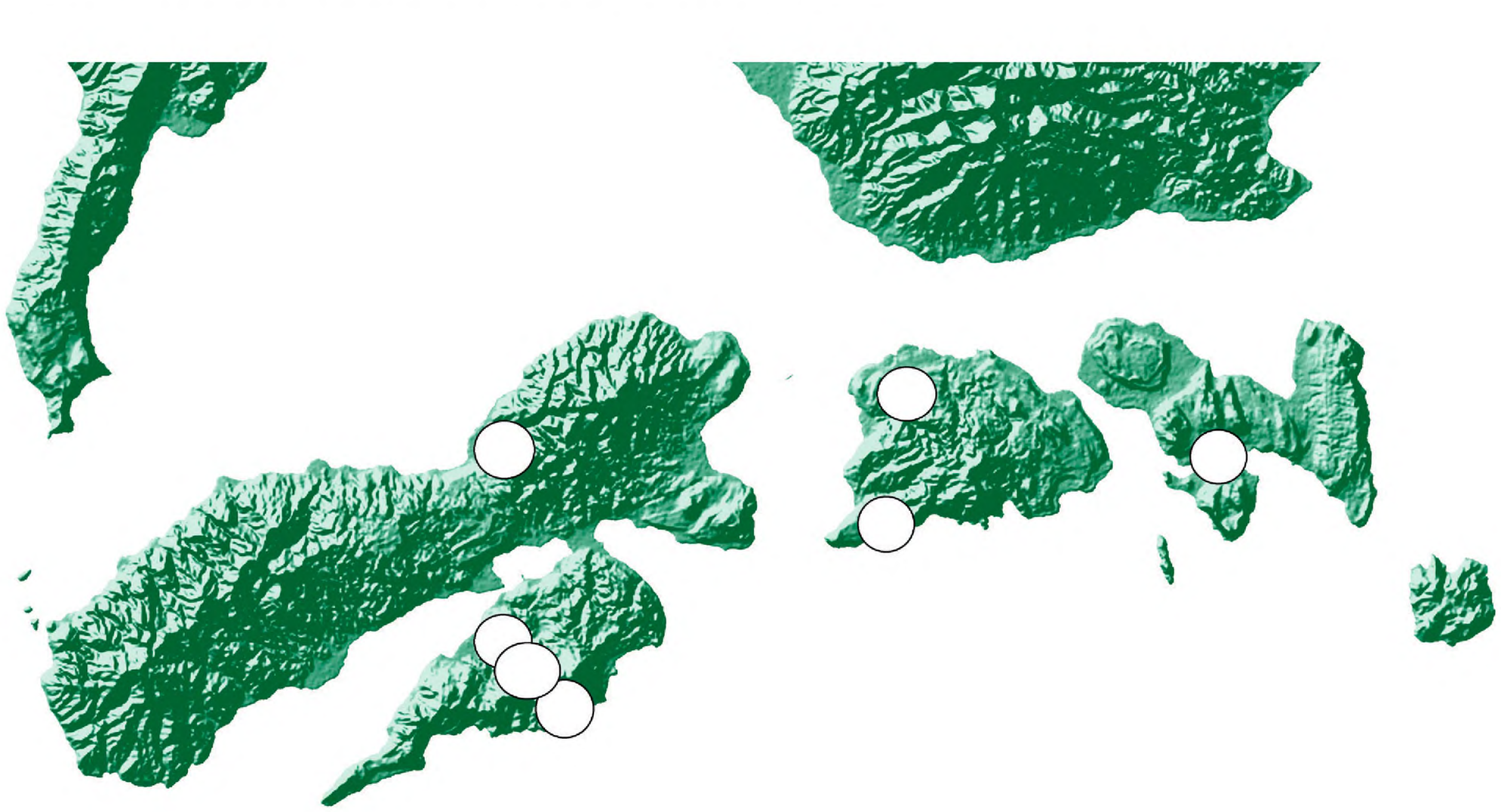


Map 7. Distribution of Diplommatinidae on Seram, Central Moluccas. Circles – *Moussonia manuselae* sp. nov.; filled circle – *Palaina* (s. l.) *carbavica* O. Boettger, 1891 (see also map 10).



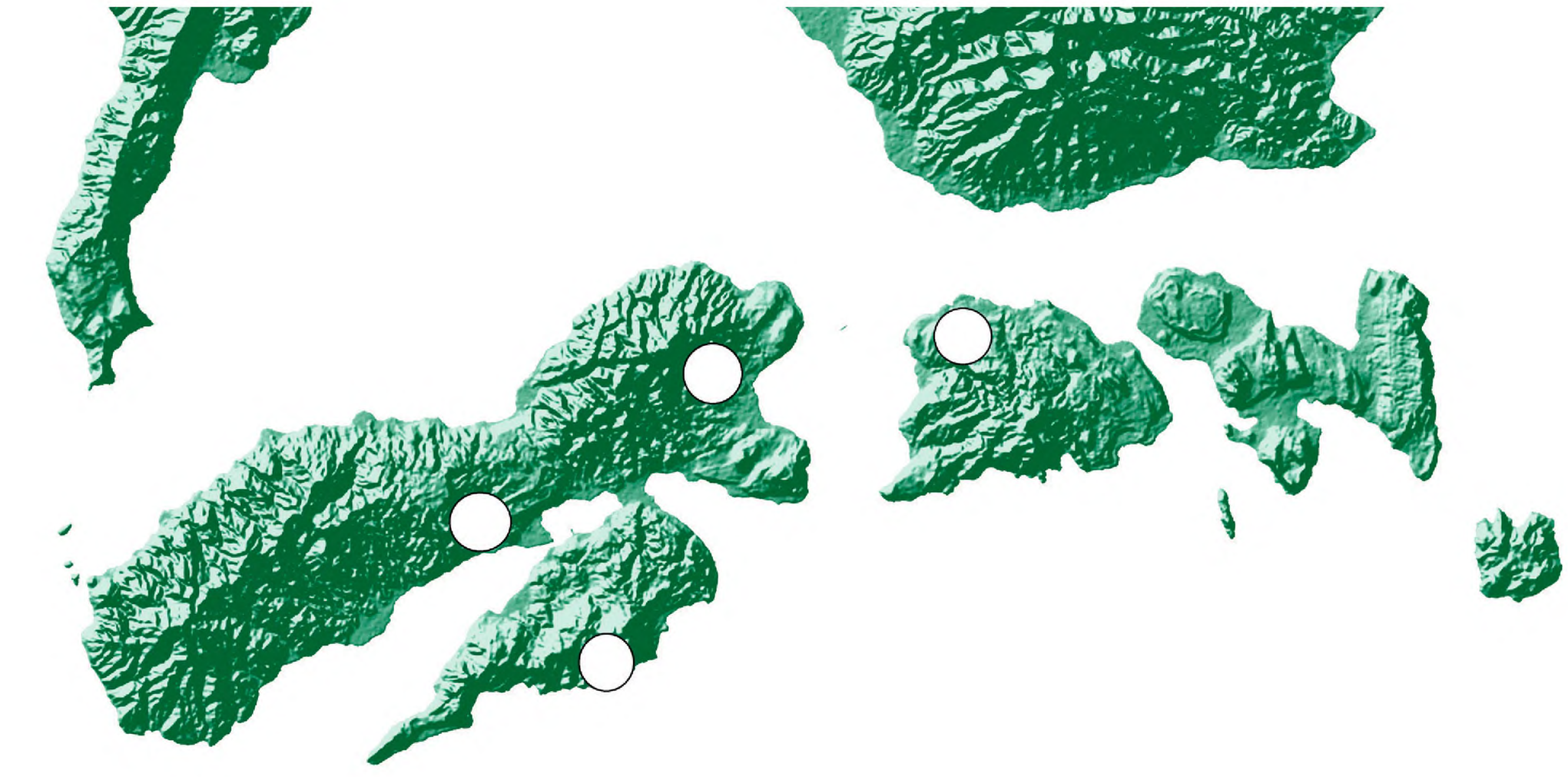


Map 8. Distribution of Diplommatinidae on Lease Islands, Central Moluccas. Circle – *Moussonia strubelli* (O. Boettger, 1891); filled circles – *Palaina* (s. l.) *angulata* O. Boettger, 1891.

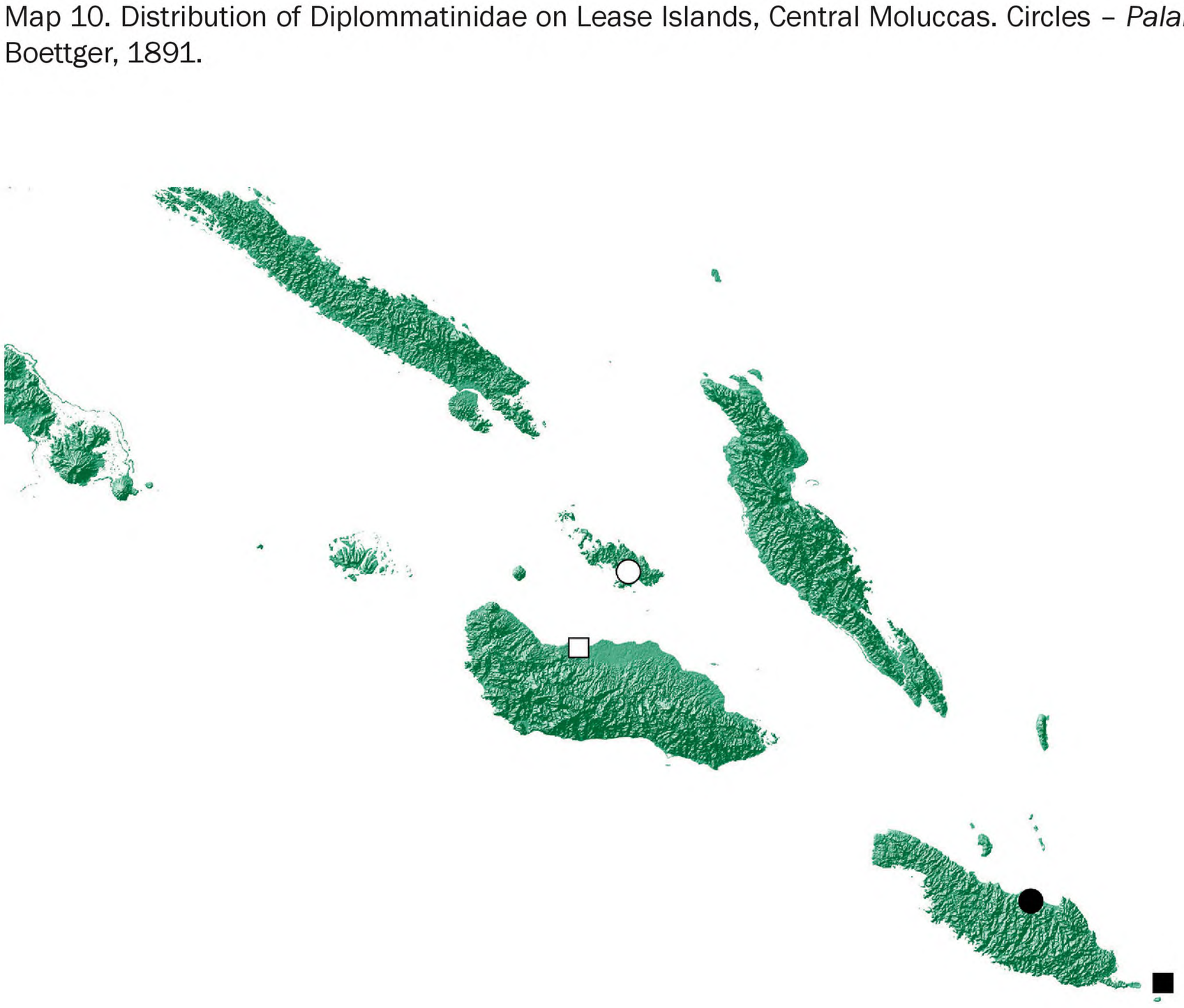


Map 9. Distribution of Diplommatinidae on Lease Islands, Central Moluccas. Circles – *Palaina* (s. l.) *ascendens* (Martens, 1864).





Map 10. Distribution of Diplommatinidae on Lease Islands, Central Moluccas. Circles – *Palaina* (s. l.) *carbavica* O. Boettger, 1891.



Map 11. Distribution of Diplommatinidae on Solomon Islands. Circle – *Palaina* (s. l.) *aerari* (Dell, 1955) (see also map 19), *P.* (s. l.) *clappi* Solem, 1960 & *P.* (s. l.) *floridensis* Solem, 1960; filled circle – *P.* (s. l.) *brazieri* (Cox, 1870); square – *P.* (s. l.) *gardneri* Dell, 1955; filled circle & filled square – *P.* (s. l.) *wisemani* (Cox, 1870).





Map 12. Distribution of Diplommatinidae on Lesser Sunda Islands. Circles – *Arinia* (s. l.) *crassiventris* B. Rensch, 1931; filled circle – *A.* (s. l.) *patagiata* van Benthem Jutting, 1958; circles & square – *A.* (s. l.) *tjendanae* B. Rensch, 1931 (see also map 15); filled squares – *Diplommatina* (s. l.) *floresiana* E.A. Smith, 1897; stars – *D.* (s. l.) *floris* B. Rensch, 1931; filled star – *D.* (s. l.) *torquilla* van Benthem Jutting, 1958; four-point star – *D.* (s. l.) *timorensis* sp. nov.



Map 13. Distribution of Diplommatinidae on Lesser Sunda Islands. Circles – *Diplommatina* (s. l.) *decollata* van Benthem Jutting, 1958; circles & filled circles – *D.* (s. l.) *fluminis* B. Rensch, 1931; squares – *D.* (s. l.) *javana* von Möllendorff, 1897; filled squares – *D.* (s. l.) *jonabletti* sp. nov. & *Palaina* (s. l.) *manggaraica* (B. Rensch, 1931).

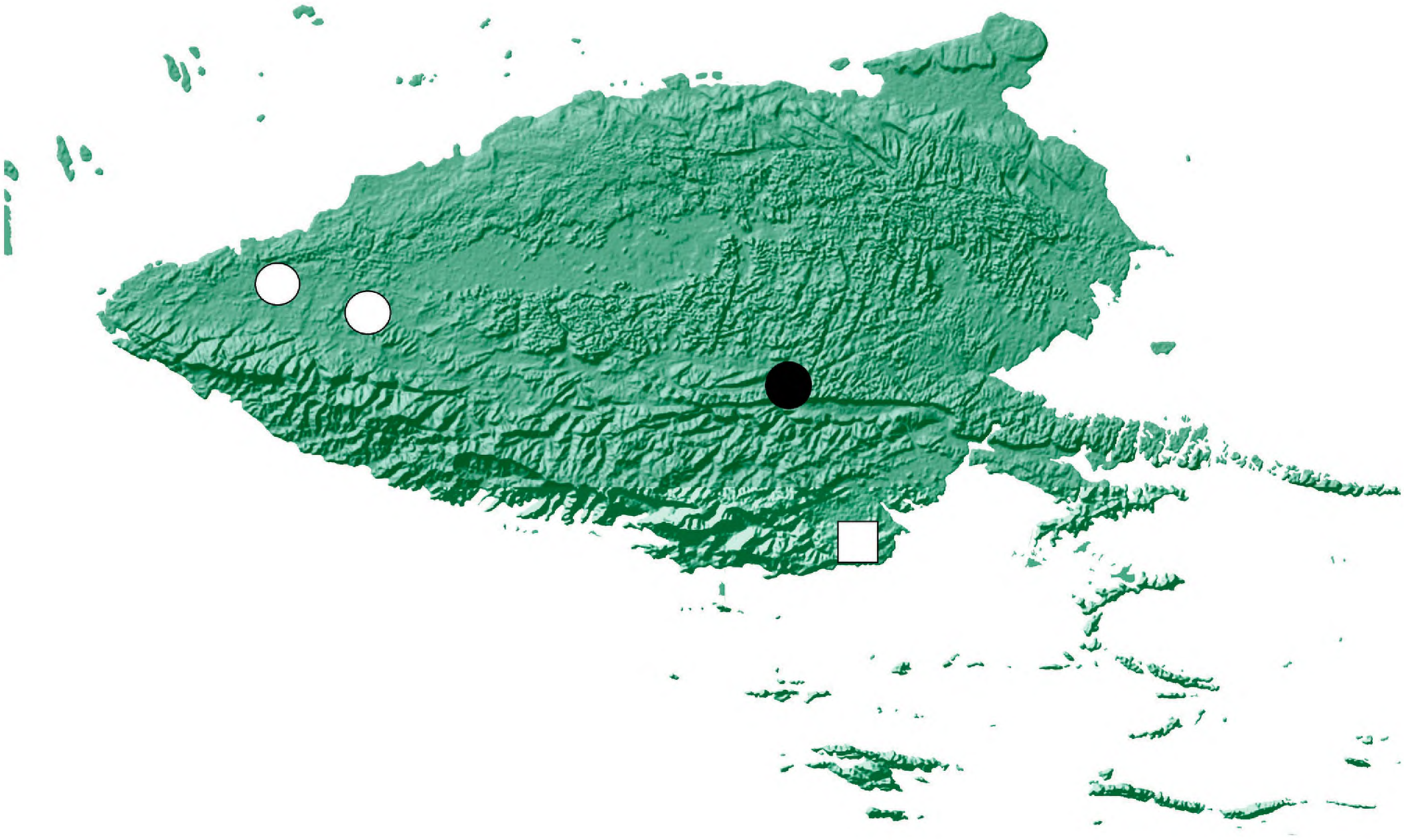




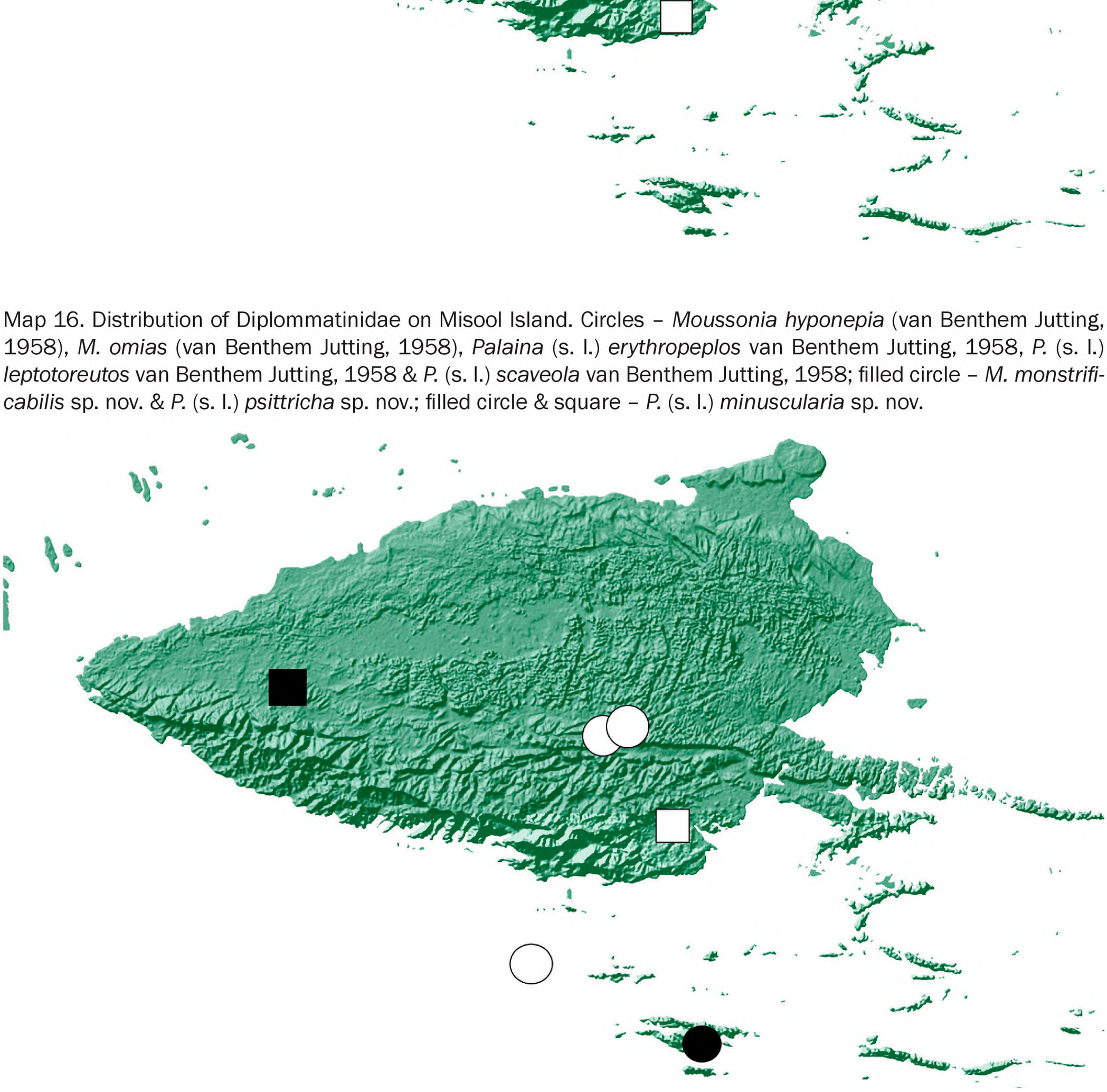
Map 14. Distribution of Diplommatinidae on Lesser Sunda Islands. Circles – *Diplommatina* (s. l.) *leucopsis* van Benthem Jutting, 1958; filled circle – *D.* (s. l.) *lucifuga* van Benthem Jutting, 1958; squares – *Palaina* (s. l.) *chrysostoma* E.A. Smith, 1897 & *P.* (s. l.) *polystoma* B. Rensch, 1931; filled square – *P.* (s. l.) *mutis* sp. nov.

Map 15. Distribution of Diplommatinidae on Aru and Tanimbar islands. Circle – *Arinia* (s. l.) *tjendanae* B. Rensch, 1931 (see also map 12); filled circle – *Diplommatina* (s. l.) *mertoni* C.R. Boettger, 1922; square – *Palaina* (s. l.) *mirifica* sp. nov., *P.* (s. l.) *tanimbarensis* sp. nov., *P.* (s. l.) *thomasrinteleni* sp. nov. & *P.* (s. l.) *yamdena* sp. nov.; filled square – *P.* (s. l.) *vermeuleni* sp. nov.



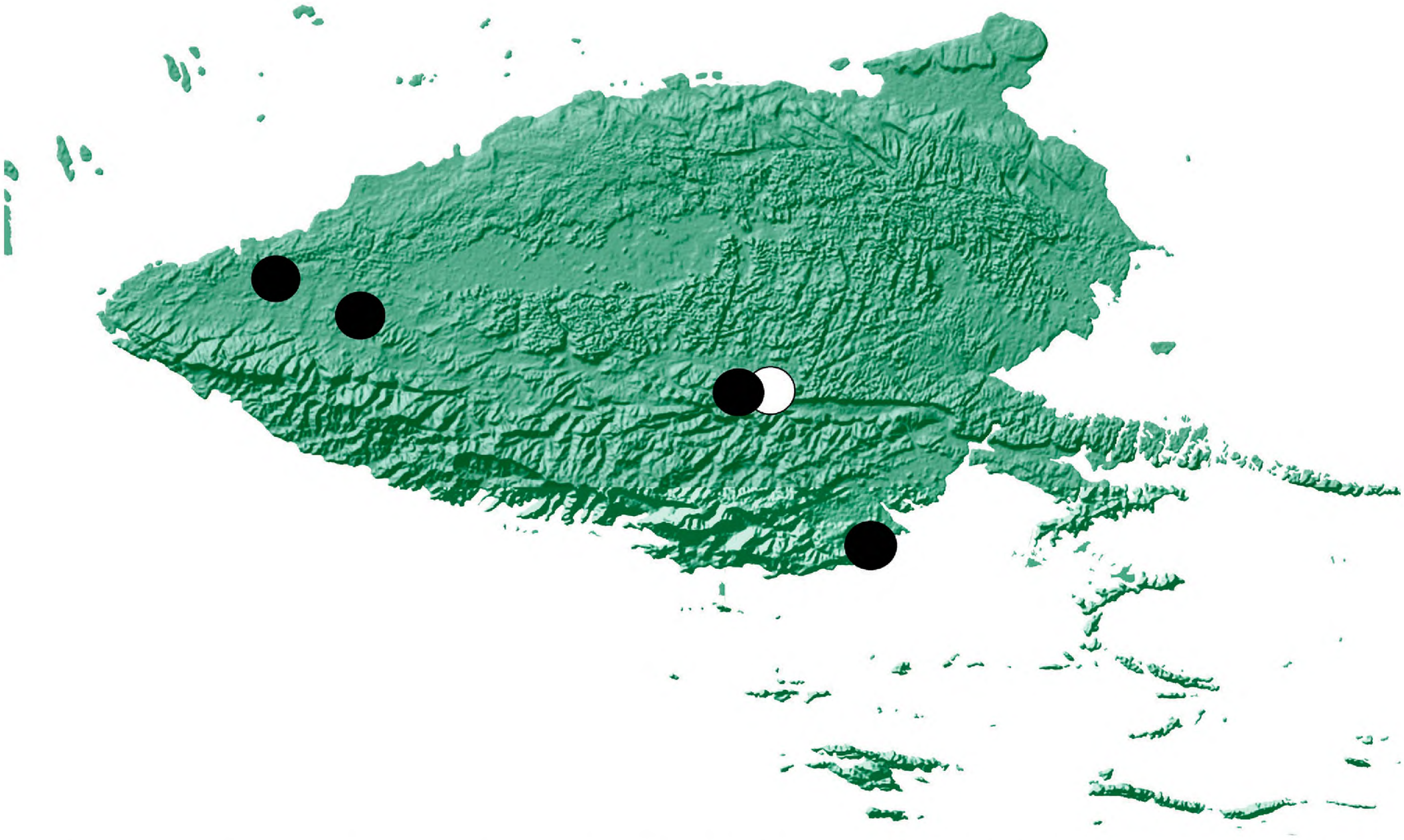


Map 16. Distribution of Diplommatinidae on Misool Island. Circles – *Moussonia hyponepia* (van Benthem Jutting, 1958), *M. omias* (van Benthem Jutting, 1958), *Palaina* (s. l.) *erythropeplos* van Benthem Jutting, 1958, *P.* (s. l.) *leptotoreutos* van Benthem Jutting, 1958 & *P.* (s. l.) *scaveola* van Benthem Jutting, 1958; filled circle – *M. monstrificabilis* sp. nov. & *P.* (s. l.) *psittricha* sp. nov.; filled circle & square – *P.* (s. l.) *minuscularia* sp. nov.

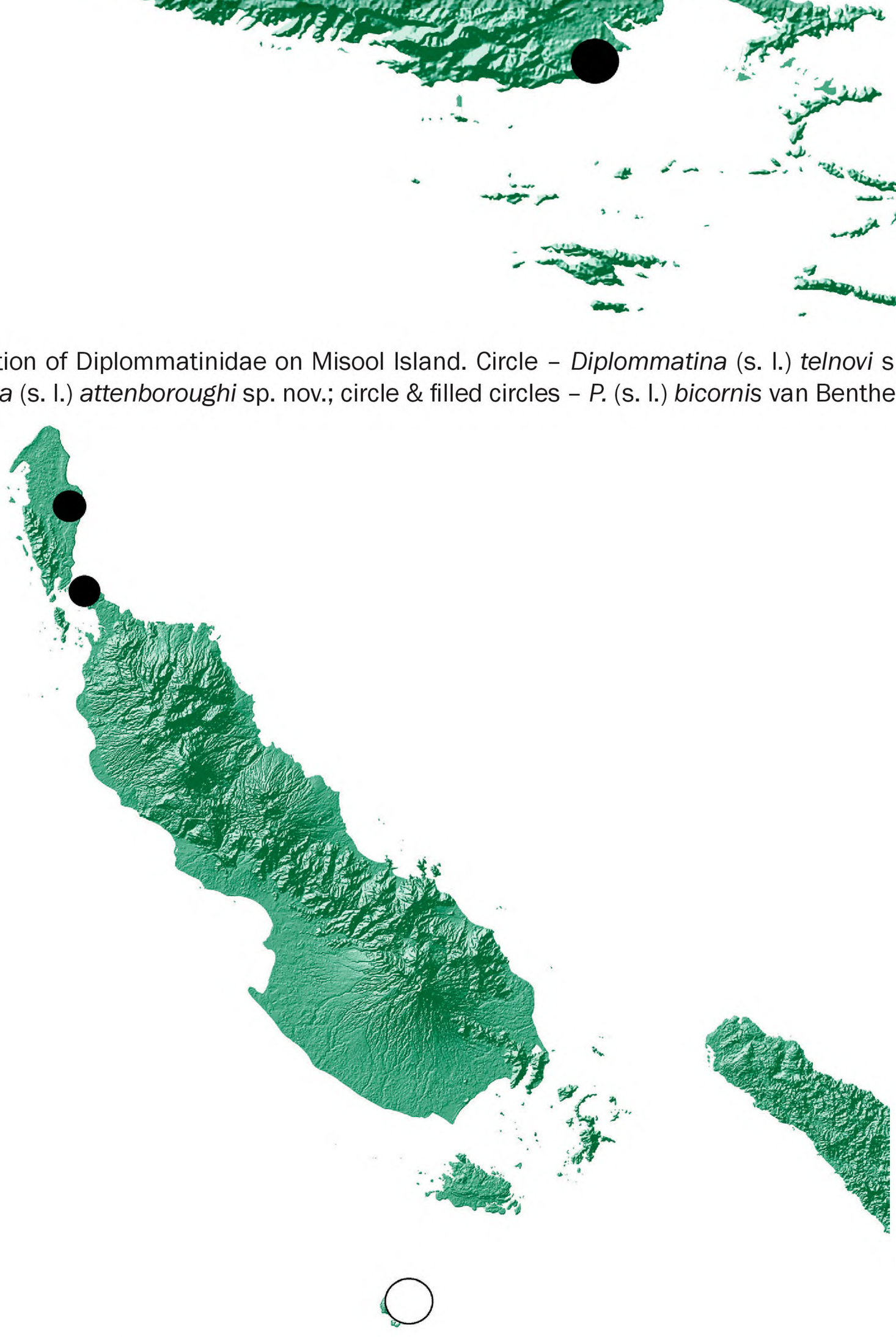


Map 17. Distribution of Diplommatinidae on Misool Island. Circles – *Moussonia separanda* sp. nov.; filled circle – *Palaina* (s. l.) *insulana* sp. nov.; square – *P.* (s. l.) *misoolensis* sp. nov.; filled square – *P.* (s. l.) *quadricornis* van Benthem Jutting, 1958.





Map 18. Distribution of Diplommatinidae on Misool Island. Circle – *Diplommatina* (s. l.) *telnovi* sp. nov. (see also map 22) & *Palaina* (s. l.) *attenboroughi* sp. nov.; circle & filled circles – *P.* (s. l.) *bicornis* van Benthem Jutting, 1958.



Map 19. Distribution of Diplommatinidae on Bougainville islands. Circle – *Palaina* (s. l.) *aerari* (Dell, 1955) (see also map 11), *P.* (s. l.) *gardneri* Dell, 1955 & *P.* (s. l.) *solomonensis* (Dell, 1955); filled circles – *P.* (s. l.) *bougainvillei* sp. nov.





Map 20. Distribution of Diplommatinidae on Waigeo and Wayag islands. Circles – *Diplommatina* (s. l.) *waigeoensis* sp. nov.; filled circle – *Palaina* (s. l.) *laszloi* sp. nov.; square – *P.* (s. l.) *imperfecta* sp. nov., *P.* (s. l.) *ponsonbyi* Sykes, 1903, *P.* (s. l.) *silvicultrix* sp. nov., and *P.* (s. l.) *wawiyai* sp. nov.



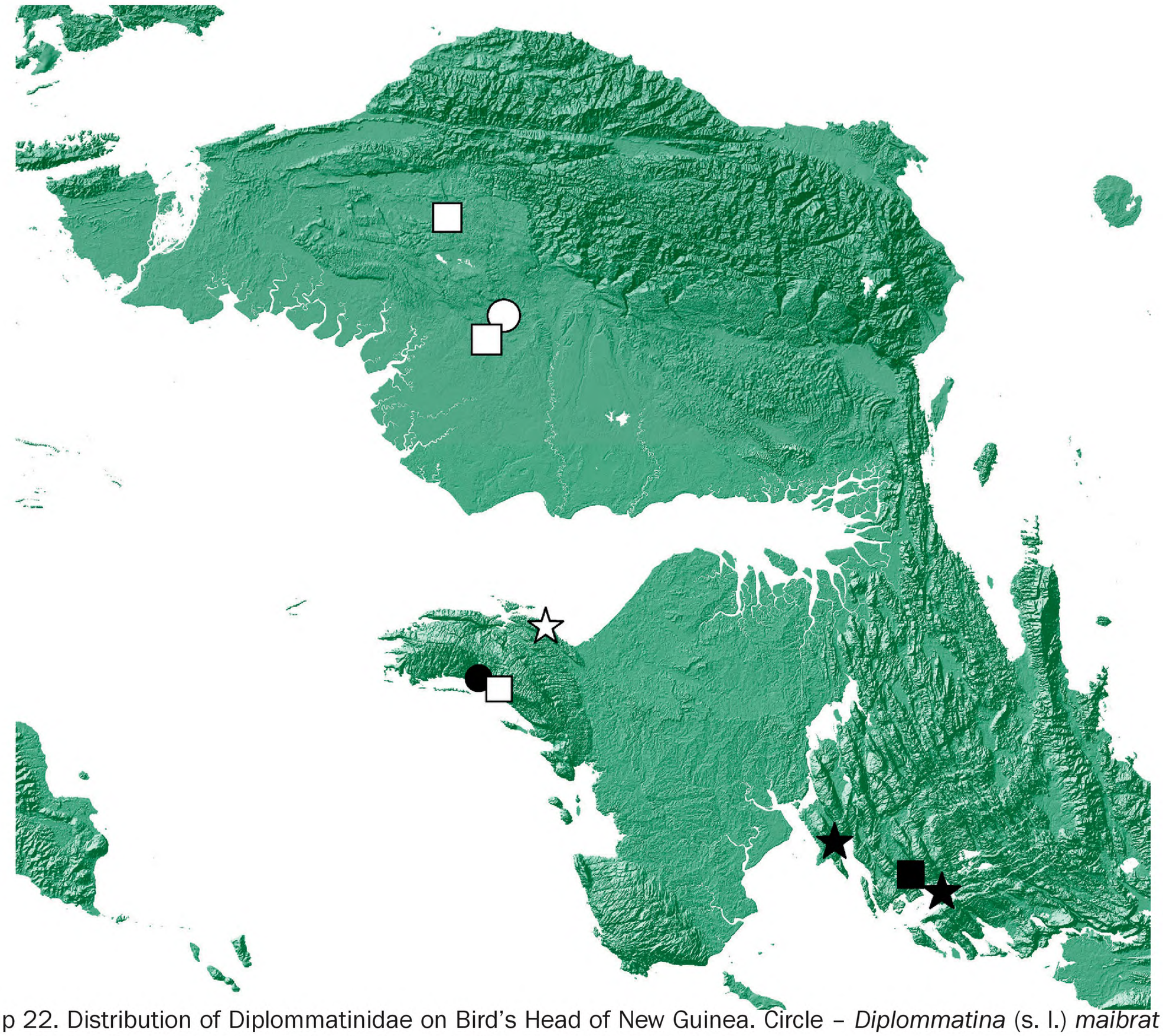
Map 21. Distribution of Diplommatinidae on Waigeo and Wayag islands. Circles – *Palaina* (s. l.) *hartmanni* sp. nov. & *P.* (s. l.) *telnovi* sp. nov.; filled circle – *P.* (s. l.) *megalostoma* sp. nov.; filled circle & square – *P.* (s. l.) *paradisaea* sp. nov.; filled square – *P.* (s. l.) *sparselamellata* sp. nov.; circles & star – *P.* (s. l.) *waigeo* sp. nov.



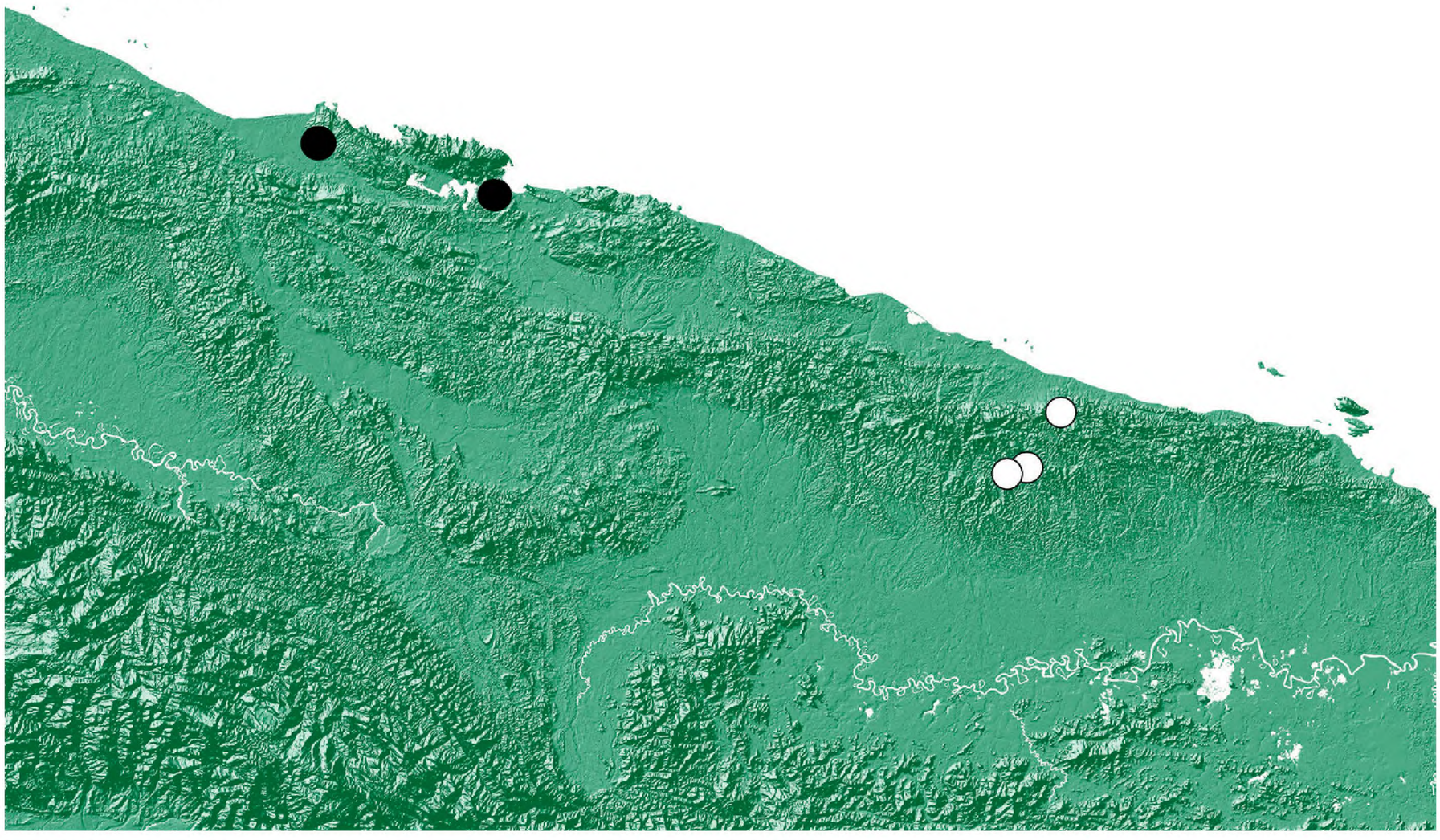








Map 22. Distribution of Diplommatinidae on Bird's Head of New Guinea. Circle – *Diplommatina* (s. l.) *maibrat* sp. nov.; filled circle – *D.* (s. l.) *smithi* Kobelt, von Möllendorff, 1898; circle & squares – *D.* (s. l.) *telnovi* sp. nov. (see also map 18); filled square – *Moussonia echinata* sp. nov.; star – *Palaina* (s. l.) *dianctoides* sp. nov.; filled stars – *P.* (s. l.) *flavocylindrica* sp. nov.



Map 23. Distribution of Diplommatinidae on North New Guinea. Circles – *Moussonia torricelli* sp. nov.; filled circles – *Palaina* (s. l.) *consobrina* van Benthem Jutting, 1963.



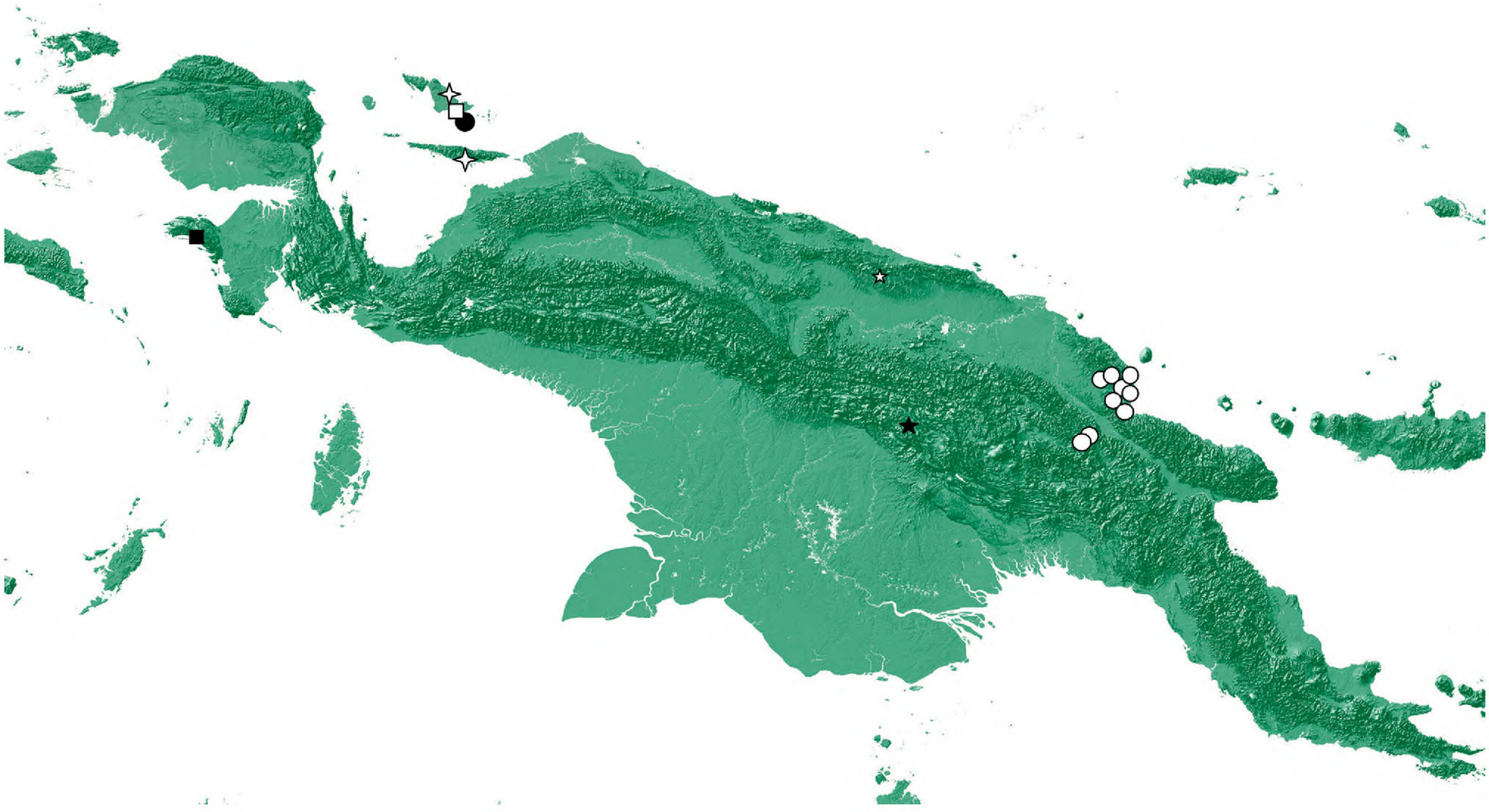


Map 24. Distribution of Diplommatinidae on Bird's Head of New Guinea. Circle – *Moussonia pseudoseparanda* sp. nov.; filled circle – *Palaina* (s. l.) *doberai* sp. nov. & *P.* (s. l.) *perspectiva* sp. nov.; circle & square – *P.* (s. l.) *dohertyi* E.A. Smith, 1897; filled square – *P.* (s. l.) *iha* sp. nov.; star – *P.* (s. l.) *lengguru* sp. nov.; star & filled star – *P.* (s. l.) *mairasi* sp. nov.

Map 25. Distribution of Diplommatinidae on Louisiade Islands. Circle – *Diplommatina* (s. l.) *symmetrica* Hedley, 1891; filled circles – *Palaina* (s. l.) *louisiade* sp. nov. (see comments in the text).

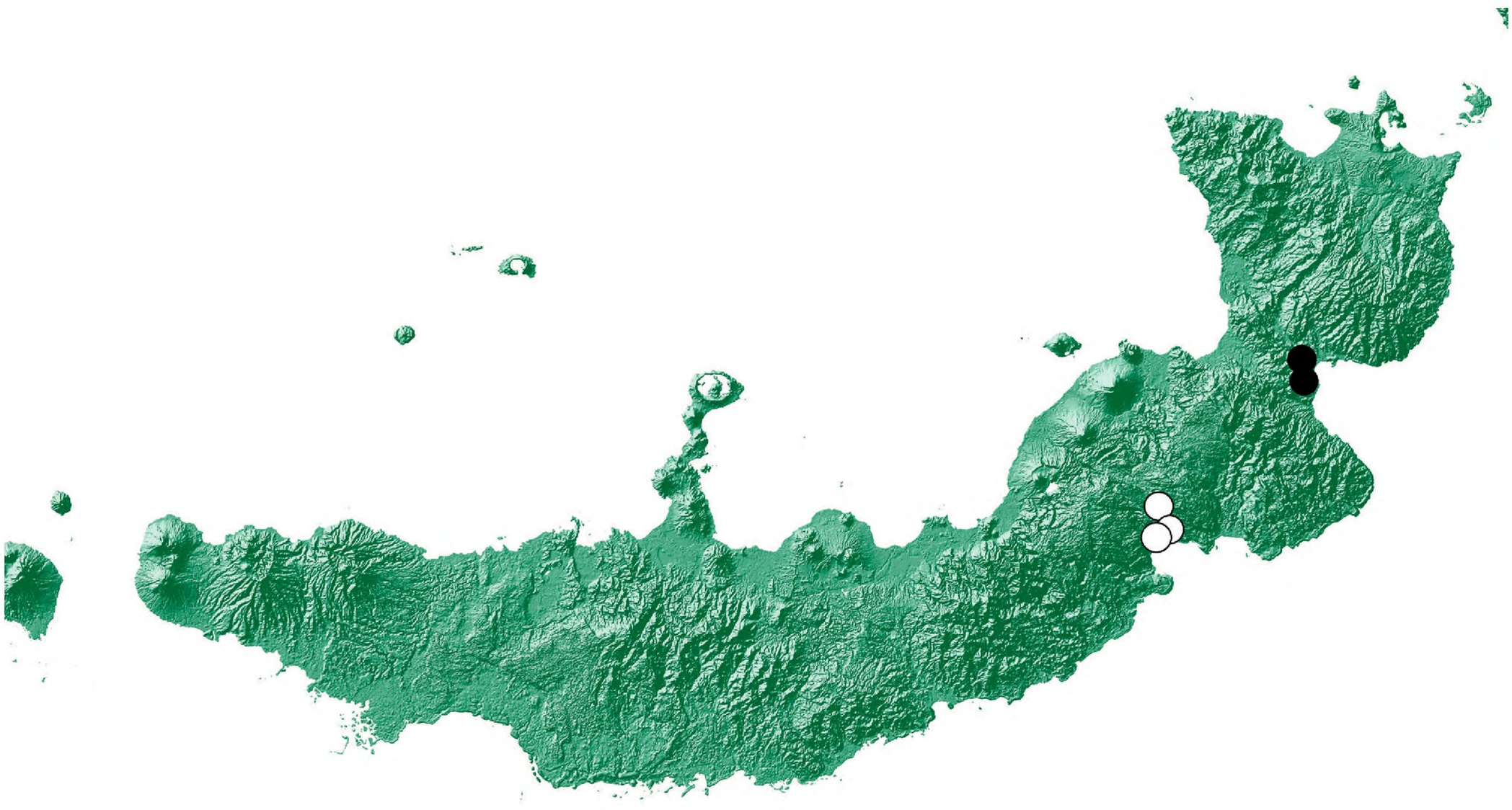


Map 26. Distribution of Diplommatinidae on New Guinea. Circles – *Palaina* (s. l.) *adelpha* Soós, 1911; filled circle – *P.* (s. l.) *bundiana* Wiktor, 1998; square – *P.* (s. l.) *citrinella* van Benthem Jutting, 1963; filled square – *P.* (s. l.) *cupulifera* van Benthem Jutting, 1963; stars – *P.* (s. l.) *extremita* sp. nov.; filled star – *P.* (s. l.) *glabella* van Benthem Jutting, 1963 & *P.* (s. l.) *repandostoma* van Benthem Jutting, 1963; four-point stars – *P.* (s. l.) *novoguineensis* E.A. Smith, 1897; filled four-point stars – *P.* (s. str.) *papuanorum* Soós, 1911; triangles – *P.* (s. l.) *slapcinskyi* sp. nov.



Map 27. Distribution of Diplommatinidae on New Guinea. Circles – *Palaina* (s. l.) *biroi* Soós, 1911; filled circle – *P.* (s. l.) *inconspicua* van Benthem Jutting, 1963; square – *P.* (s. l.) *liliputana* van Benthem Jutting, 1963; filled square – *P.* (s. l.) *onin* sp. nov.; star – *P.* (s. l.) *albrechti* sp. nov.; filled star – *P.* (s. l.) *papuamontis* sp. nov.; four-point stars – *P.* (s. l.) *propinqua* van Benthem Jutting, 1963.





Map 28. Distribution of Diplommatinidae on New Britain Island. Circles & filled circles – *Palaina* (s. l.) *commixta* I. Rensch, 1937; filled circles – *P.* (s. l.) *granulum* I. et B. Rensch, 1929 & *P.* (s. l.) *schneideri* I. et B. Rensch, 1929.



Map 29. Distribution of Diplommatinidae on New Britain Island. Circle – *Palaina* (s. l.) *mengen* sp. nov.; filled circles – *P.* (s. l.) *novopommerana* I. et B. Rensch, 1929.






Contribution to the knowledge of Dermestidae (Coleoptera) from the Maluku Islands (Indonesia), part 2. Description of four new species of *Orphinus* Motschulsky, 1858

Jiří Háva

Department of Forest Protection and Entomology, Faculty of Forestry and Wood Sciences, Czech University of Life Sciences, Kamýcká 1176, CZ-165 21, Prague 6 - Suchdol, Czech Republic; e-mail: jh.dermestidae@volny.cz

Abstract: Four species of Dermestidae are described, illustrated and compared as follows: *Orphinus* (s. str.) *soleae* sp. nov., *Orphinus* (s. str.) *jakli* sp. nov., *Orphinus* (s. str.) *prescutellaris* sp. nov. and *O.* (s. str.) *buruanus* sp. nov., all from the Maluku Islands, belonging to the nominotypical subgenus. The species *Orphinus* (s. str.) *wau* Háva, 2014 is newly recorded from West Papua.

Key words: Coleoptera, Dermestidae, Megatomini, *Orphinus*, Maluku Islands, taxonomy, new species.

Introduction

The family Dermestidae (Coleoptera: Bostrichoidea) contains about 1500 species and subspecies worldwide (Háva 2015). Its members are "mainly scavengers on dried proteinaceous material and are of economic importance because the family includes species that are pests of stored products or natural history enemies" (Lawrence & Ślipiński 2005).

The Dermestidae from Maluku Islands were recently dealt with by Háva (2014b). Works dealing with Dermestidae from Indonesian Papua were published by Háva (2011; 2014a) and Kadej & Háva (2013; 2014). So, the Dermestidae from Maluku Islands have been only sparingly studied, four species being reported, which belong to the subfamilies Dermestinae, Attageninae and Megatominae. In the present article, four new species are described from Buru and Seram Islands, belonging to the genus *Orphinus*.

Materials and methods

The size of the beetle and of its body parts can be useful in species recognition, so following measurements were made:

total length (TL) – linear distance from anterior margin of pronotum to apex of elytra.

elytral width (EW) – maximum linear transverse distance.

Specimens of the presently described species are provided with red, printed label with the text as follows: "HOLOTYPE [or PARATYPE, respectively] *name of taxon* sp. nov. Jiří Háva det. 2016".

Abbreviations used in the text:

BMNH – The Natural History Museum, London, United Kingdom;

JHAC – Jiří Háva, Private Entomological Laboratory & Collection, Únětice u Prahy, Prague-west, Czech Republic (will be deposited in the Czech University of Life Sciences, Prague).

Taxonomic part

Orphinus Motschulsky 1858

Orphinus wau Háva, 2014

Material examined 2♀ JHAC: Indonesia, West Papua, Manokwari distr., Maibri vill., Arfak Mts., 1570 m, 5-19. xii.2012, J. Horák lgt.

Distribution: A species known from Papua New Guinea: Wau, new to West Papua: Manokwari district.









Orphinus (s. str.) ***soleae* sp. nov.** (Figs 1-3)
Holotype ♂ JHAC: Maluku, Seram, 12 km SE Wahai, Solea, i.1999, ex larva, J. Horák lgt.
Paratypes 2♀ JHAC: the same data as holotype; 1♀ BMHN: Indonesia: Seram, Solea, Malaise Trap on River bank, viii.1987, M.C. Day, BMNH{E}2004-198.

Derivatio nominis: Toponymic, named after the type locality Solea.
Description: Male. Body oval, TL 2.8 mm, EW 1.8 mm. Head, pronotum and elytra black, shiny, with white fasciae (Fig. 1), black on venter. Head finely punctate with long, erect, black setation. Palpi brown; setation on mentum denser. Eyes small, with brown microsetae. Ocellus on front present. Antennae brown with yellow setae, with 11 antennomeres, antennal club with 2 antennomeres, terminal antennal segment circular (Fig. 2). Pronotum black, disc finely punctate, densely foveolate posteriorly, with long, erect, black and white setation. Scutellum black, triangular, without setation. Elytra finely punctate; humerus with a small bump; elytral surface with long, erect black and white setation; cuticle black, white setation forming two spots (one near scutellum and one apically) and two transverse fasciae (Fig. 1). Epipleuron black, anteriorly broad, finely punctate, with short, black setation. Legs dark brown with yellow setation. Mesosternum coarsely punctate laterally, otherwise finely punctate, covered by long, recumbent, white setation. Abdominal visible ventrites dark brown to black, with long, recumbent, white setation. Male genitalia as in Fig. 3.
Sexual dimorphism: Female externally similar to male, but differs by its small antennal terminal antennomere.
Differential diagnosis: The new species is similar to *O. wau* Háva, 2014 (Papua New Guinea: Wau, West Papua: Manokwari district) but differs from it by the elytral fasciae (*O. soleae* has white transverse fasciae, divided into spots; *O. wau* has whitish-grey transverse fasciae, not divided into spots) and the antennal club structure.

Orphinus (s. str.) ***jakli* sp. nov.** (Figs 4-6)
Holotype ♂ JHAC: Indonesia, Maluku, E Buru, Ilath env., Remaja Mt., 200 m, 7-14.i.2013, J. Horák lgt.
Paratypes 3 specimens JHAC: IND: C Moluccas, Buru Is., Ilath env., Remaja Mt., 200-350m, 5-18.i.2013, S. Jakl lgt.

Derivatio nominis: Patronymic. The new species is dedicated to Stanislav Jákl (Prague, Czech Republic), a world known expert in the beetle family Scarabaeidae subfamily Cetoniinae.
Description: Male. Body oval, TL 2.6 mm, EW 1.6 mm. Head black, pronotum and elytra black and reddish, shiny, with white fasciae (Fig. 4), black on venter. Head finely punctate with long, erect, black setation. Palpi brown; setation on mentum denser. Eyes small, with brown microsetae. Ocellus on front present. Antennae brown with yellow setae, with 11 antennomeres, antennal club with 2 antennomeres, terminal antennal segment circular (Fig. 5). Pronotum black with small indistinct reddish spots, disc finely punctate, densely foveolate posteriorly, with long, erect, black and white setation. Scutellum black, triangular, without setation. Elytra finely punctate; humerus with a small bump; elytral surface with long, erect



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Figures 1-3. *Orphinus soleae* sp. nov., holotype ♂. 1 – Habitus, dorsal view; 2 – Antennae; 3 – Male genitalia.






black and white setation; cuticle black and reddish; cuticular reddish spots and fasciae covered by white setation (a spot near scutellum and another one apically) and two transverse fasciae (Fig. 1). Epipleuron black, anteriorly broad, finely punctate, with short, black setation. Legs dark brown with yellow setation. Mesosternum coarsely punctate laterally, otherwise finely punctate, covered by long, recumbent, white setation. Abdominal visible ventrites black, with long, recumbent, white setation. Male genitalia as in Fig. 6.

Sexual dimorphism: Female externally similar to male, but differs by its small antennal terminal antennomere.

Differential diagnosis: The new species is externally very similar to *O. soleae* sp. nov. but differs from it by the elytral cuticular reddish fasciae covered by white setation (in *O. soleae*, the elytra are unicolorously black with white spots, without reddish fasciae), structure of antennae and male genitalia.

Orphinus (s. str.) ***prescutellaris*** **sp. nov.** (Figs 7-10)

Holotype ♂ JHAC: Indonesia, Maluku, E Buru, Ilath env., Remaja Mt., 200 m, 7-14.i.2013, J. Horák lgt.

Paratypes 28 specimens JHAC: 11 specimens same label as in holotype; 17 specimens: IND: C Moluccas, Buru Is., Ilath env., Remaja Mt., 200-350m, 5-18.i.2013, S. Jakl lgt.

Derivatio nominis: The name is based on the presence of the elytral prescutellar spot.

Description: Male holotype. Body oval, TL 1.6 mm, EW 1.1 mm. Head and pronotum black, elytra black and orange-reddish, shiny, with fasciae (Fig. 7), black on venter. Head finely punctate with long, erect, yellow setation. Palpi brown; setation on mentum denser. Eyes small, with brown microsetae. Ocellus on front present. Antennae brown with yellow setae, with 11 antennomeres, antennal club with 2 antennomeres, terminal antennal segment circular (Fig. 9). Pronotum black, disc finely punctate, densely foveolate posteriorly, with long, suberect, yellow setation. Scutellum black, triangular, without setation. Elytra finely punctate; humerus with a small bump; elytral surface with long, suberect black and yellow setation; cuticle black and orange-reddish; cuticular orange-reddish spots and fasciae covered by yellow setation (a spot near scutellum and a transverse medial fascia in apical third) (Figs 7-8). Epipleuron black, anteriorly broad, finely punctate, with short, black setation. Legs dark brown with yellow setation. Mesosternum coarsely punctate laterally, otherwise finely punctate, covered by long, recumbent, yellow setation. Abdominal visible ventrites black, with long, recumbent, yellow setation. Male genitalia as in Fig. 10.

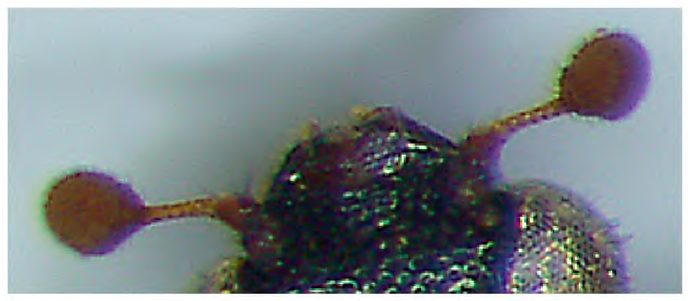
Sexual dimorphism: Female is unknown.

Variability: The type series includes specimens with black or brown elytra (Figs 7-8). Measurements: TL 1.6-2.4mm, EW 1.1-1.6 mm.

Differential diagnosis: The new species is very similar to two Papuan species *O. biroi* Pic, 1956 (Papua New Guinea) and *O. fasciatus* (Matsumura et Yokoyama, 1928) (Papua New Guinea, Cambodia, Japan, Philippines, Singapore, Taiwan) but differs from them by the presence of a prescutellar spot on elytra (in *O. biroi* and *O. fasciatus* the prescutellar spot is missing); from other species it differs by the



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5



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Figures 4-6. *Orphinus jakli* sp. nov., holotype ♂. 4 – Habitus, dorsal view; 5 – Antennae; 6 – Male genitalia.



structure of antennae and male genitalia.

Orphinus (s. str.) ***buruanus*** **sp. nov.** (Figs 11-13)
Holotype ♂ JHAC: Indonesia, Maluku, E Buru, Ilath env., Remaja Mt., 200 m, 7-14.i.2013, J. Horák lgt.
Paratypes 2♂ JHAC: same label as in holotype.

Derivatio nominis: Toponymic, named after the type locality Buru Island.
Description: Male. Body parallel and oval, TL 1.8-2.2 mm, EW 1.1-1.4 mm. Head, pronotum and elytra dark brown, shiny (Fig. 11), dark brown on venter. Head coarsely punctate with long, erect, brown setation. Palpi brown; setation on mentum denser. Eyes small, with yellow microsetae. Ocellus on front present. Antennae brown with yellow setae, with 11 antennomeres, antennal club with 2 antennomeres, terminal antennal segment circular (Fig. 12). Pronotum brown, disc finely punctate, densely foveolate posteriorly, with long, erect, brown setae. Scutellum brown, triangular, without setation. Elytra brown, finely punctate; humerus with a small bump; elytral surface with long, suberect brown setation. Epipleuron brown, anteriorly broad, finely punctate, with short, brown setation. Legs dark brown with brown setation. Mesosternum coarsely punctate laterally, otherwise finely punctate, covered by long, recumbent, brown setation. Abdominal visible ventrites brown, with long, recumbent, brown setation. Male genitalia as in Fig. 13.



7



8



9



10

Figures 7-10. *Orphinus soleae* sp. nov. 7 – Habitus, dorsal view, holotype ♂; 8 – Habitus, dorsal view, paratype ♀; 9 – Antennae; 10 – Male genitalia.



11



12



13

Figures 11-13. *Orphinus buruanus* sp. nov., holotype ♂. 11 – Habitus, dorsal aspect; 12 – Antennae; 13 – Male genitalia.









Sexual dimorphism: Female is unknown.

Differential diagnosis: The new species is similar to *O. harvey* Kadej et Háva, 2014 (Papua New Guinea) and *O. fulvipes* (Guérin-Méneville, 1838) (cosmopolitan species) but differs from them by the following characters:

1 Terminal antennal segment oval, anterior pronotal angles in male not visible from above, dorsal integument dark brown ..... *O. harvey* Kadej, Háva, 2014
– Terminal antennal segment circular 2
2 Terminal antennal segment flat and large, anterior pronotal angles in male visible from above, dorsal integument from light brown to brown .... *O. fulvipes* (Guérin-Méneville, 1838)
– Terminal antennal segment small, anterior pronotal angles in male not visible from above, dorsal integument dark brown ..... *O. buruanus* sp. nov.

List of Dermestidae species recorded from the Central Maluku Islands

Taxon	Ambon	Buru	Seram
Dermestinae, Tribe Dermestini			
Dermestes (*Dermestes*) *ater* DeGeer, 1774	X	X	X
Dermestes (*Dermestinus*) *maculatus* DeGeer, 1774		X	
Attageninae, Tribe Attagenini			
Attagenus undulatus (Motschulsky, 1858)		X	X
Katkaenus buruanus Háva, 2014		X	
Megatominae, Tribe Megatomini			
Orphinus (*Orphinus*) *buruanus* sp. nov.		X	
Orphinus (*Orphinus*) *jakli* sp. nov.		X	
Orphinus (*Orphinus*) *prescutellaris* sp. nov.		X	
Orphinus (*Orphinus*) *soleae* sp. nov.		X	
Thaumaglossa chujoi Ohbayashi, 1982	X		

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Revision of the genus *Aprosictus* Pascoe, 1866 (Coleoptera: Cerambycidae: Strongylurini), with description of a new genus and fourteen new species

Philippe Jacquot

85 impasse Charlotte Berrang, F-26740, Montboucher-sur-Jabron, France; e-mail: cerambyphil@gmail.com

Abstract: The genus *Aprosictus* Pascoe, 1866 is revised. Twelve new species of this genus are described: *Aprosictus acutipennis* sp. nov., *A. armellae* sp. nov., *A. dilatoscapus* sp. nov., *A. exiguus* sp. nov., *A. fuscus* sp. nov., *A. glabrofasciatus* sp. nov., *A. lombokensis* sp. nov., *A. paloloensis* sp. nov., *A. pedicellus* sp. nov., *A. sangirensis* sp. nov., *A. sexpunctatus* sp. nov. and *A. ternatensis* sp. nov. *Aprosictus truncatus* Aurivillius, 1916 and *A. bilineatus* Ritsema, 1881 are transferred into the new genus *Duplipectus* gen. nov.: *Duplipectus truncatus* (Aurivillius, 1916) comb. nov. and *Duplipectus bilineatus* (Ritsema, 1881) comb. nov. Two new species of this new genus are described, namely *D. buruensis* sp. nov. and *D. degroofi* sp. nov. For the first time, females of those two genera are described. Keys to the males and distribution maps are given.

Key words: Coleoptera, Cerambycidae, Cerambycinae, Strongylurini, *Aprosictus,* revision, new species, *Duplipectus*, new genus.

Introduction

In 1866, Kaup described the genus *Westwoodia* for the species *Westwoodia duivenbodei*. *Westwoodia* was preoccupied by an Australian genus of Ichneumonidae (Hymenoptera) described by Brullé (1846), so Pascoe proposed the replacement name *Aprosictus* in 1866. In 1869, Lacordaire redescribed *Aprosictus,* clarifying certain details. Among these, is one that requires a small correction. On page 382 he states, regarding the 11th segment of the antennae: "11 cylindrique, aussi grand que 8-10 réunis" [1], a statement that is in disagreement with the description of Kaup (1866) for whom, "das 11 freie ist so lang als alle 8 vorhergehenden" [2]. In fact, I conclude that for all species of *Aprosictus*, the 11th segment of antennae is much longer than segments 8 to 10 combined.

Four species have hitherto been described within the genus *Aprosictus*: *A. duivenbodei* (Kaup, 1866) from Sulawesi, *A. bilineatus* Ritsema, 1881 discovered on Waigeo (also written "Waigeoe" in Ritsema, 1881 or "Waigiu" in Aurivillius, 1916 or "Waigiou" in Gressitt, 1959 or "Waigeu" in Gressitt & Szent-Ivany, 1968), *A. intricatus* Blackburn, 1889 caught in the south of the Northern Territory in Australia, and *A. truncatus* Aurivillius, 1916 which comes from the valley of the Sepik river in New Guinea.

Of these four species, *A. bilineatus* and *A. truncatus* do not really correspond to the description of the genus because the antennae have lobes on both sides rather than one side only, and have major lamelliform lobes instead of filiform as was described for *Aprosictus*. This difference had already been mentioned by Aurivillius (1916) who commented on *A. truncatus*: "Durch die Bildung der Fühler steht diese interessante Art in der Mitte zwischen *Aprosictus* und *Piezarthrius*, indem die Anhänge der vorderen Seite der Fühler wie bei dieser Gattung flachgedrückt, die der Hinterseite aber drehrund und fadenförmig sind; beide sind dicht feinhaarig" [3]. Curiously, this difference did not encourage the author to separate these species into two distinct genera.

In 1959, Gressitt indicated in his key to

1 The 11th is cylindrical, as long as 8-10 combined.

2 The 11th antennomere alone is as long as the previous 8 segments.

3 This interesting species lies between the genus *Aprosictus* and *Piesarthrius* due to the shape of its antennae. It has compressed lamella-shaped lobes in front of its antennae, as in the latter genus, and cylindrical filiform lobes behind its antennae. Those two kinds of ornamentation are covered with short setae.





Aprosictus from New Guinea that *A. bilineatus* has flabellate antennae on one side only, but in *A. truncatus* they are flabellate on both sides. In reality, *A. bilineatus* does have flabellate antennae on two sides, as briefly described by Ritsema in 1881. Aurivillius (1916), in his description of *A. truncatus,* makes an error in stating that *A. bilineatus* differs from the previous species in having combs only on one side of the antennae: "*A. bilineatus* RITS. aus Waigiu scheint etwas ähnlich zu sein, weicht aber durch die an der Spitze bedornten Flügeldecken und die nur einseitig gekämmten Fühler ab" [4]. The error was then taken up by Gressitt (1959).

Recently, Ślipiński & Escalona (2016) put *Aprosictus* in synonymy with the genus *Piesarthrius* without specifying in their work why this was done. In fact, this decision was made following preliminary work on Australian cerambycids during a large genomic study project initiated by Duane McKenna (Memphis University, Tennessee, in progress) on the world's phytophagous beetles. Preliminary data suggest that the genus *Aprosictus* is derived from the genus *Piesarthrius*, which itself forms a sterile branch in evolution (Adam Ślipiński, pers. comm.). Although these two genera form a well-supported monophyletic group with *Opsidota* and *Strongylurus* (Calder 2000), I will not retain this affiliation (which might seem possible if only Australian species are taken into account, and the shape of the antennae is considered as a highly variable character in this group). *Aprosictus* differs from *Piesarthrius* in the filiform and non lamelliform antennal lobes (Lacordaire 1869) and by the presence of fine bristly setae on all surfaces (Gressitt 1959). Moreover, Adam Ślipiński himself acknowledges that the genus *Aprosictus* seems to form a distinct group, but requires clarification of its position in relation to *Piesarthrius* and related taxa for confirmation of this. While only one species of *Aprosictus* is present in Australia, there are three others present in Indonesia, two of which clearly do not fall within the definition of the genus.

Therefore, I propose to integrate *A. bilineatus* and *A. truncatus*, as well as two new species discovered in 2013 and 2015, in a new genus: *Duplipectus* gen. nov.

Discussion about the choice of the tribe

The tribe Strongylurini was defined for the first time by Lacordaire (1869) under the name "*Strongylurides*" with two genotypes: *Strongylurus* Hope, 1835 and *Piesarthrius* Hope, 1834. The name of the tribe was changed without explanation to Piesarthrini by McKeown (1947). In fact, he had first changed the genus *Strongylurus* Hope, 1835 to *Coptopterus* Hope, 1834, claiming that *Strongylurus* was preoccupied by *Strongylura* Hasselt, 1923, a genus of fishes and that is why McKeown decided to replace Strongylurini by Piesarthrini (Elliot & McDonald 1972). Bouchard & al. (2011), in their "Family-group names of Coleoptera (Insecta)", maintain the name Piesarthriini arguing that it was used as valid before 2000 as in Gressitt (1959: 84, as Piesarthini) and was not rejected by an author who, between 1961 and 1999, applied Article 13 of the then current edition of the International Code of Zoological Nomenclature (see Art. 13.2.1). Elliot & McDonald (1972) have however contested the use of Piesarthriini by justifying that the worker who first names a family-group has priority over any subsequent names according to the Art. 64 of the International Code of Zoological Nomenclature (1961), furthermore they contest the replacement of *Strongylurus* by *Coptopterus*, because a single letter is sufficient to distinguish two genera (*Strongylurus* and *Strongylura*) according to the Art. 56(a) of the same code.

At present, the composition of the tribe Strongylurini is not definitively established. Lacordaire (1869) during the creation of the tribe, incorporated the genus *Anatisis* Pascoe, 1867 (= *Piesarthrius* Hope, 1834), *Aprosictus* Pascoe, 1866, *Bebius* Pascoe, 1865, *Exæreta* Pascoe, 1865 (= *Exaeretiformis* McKeown, 1945), *Heterolepis* Lacordaire, 1869 (= *Lacordairina* Vives, Sudre, Miles et Cazares, 2011), *Lygesis* Pascoe, 1864, *Opsidota* Pascoe, 1864, *Oxymagis* Pascoe, 1866 (incertae sedis), *Piesarthrius* Hope, 1834 and *Strongylurus* Hope, 1835. McKeown (1947) includes in this tribe the genus *Aprosictus* Pascoe, 1866, *Bebius* Pascoe, 1865, *Coptopterus* Hope, 1834 (= *Strongylurus* Hope, 1835), *Exaeretiformis* McKeown, 1945, *Lygesis* Pascoe, 1864, *Piesarthrius* Hope, 1834, *Opsidota* Pascoe, 1864, *Oxymagis* Pascoe, 1866, *Phantissus* McKeown, 1940 and *Tya* McKeown, 1940. In the Titan database (Tavakilian & Chevillotte 2013), the two tribes are present: Piesarthriini includes the genera *Exaeretiformis* McKeown, 1945, *Aprosictus* Pascoe, 1866, *Opsidota* Pascoe, 1864, *Piesarthrius*

4 *A. bilineatus* from Waigeo looks identical, however is differentiated by the toothed apex of the elytra and combs located on only one side of the antennae.






Hope, 1834; Strongylurini includes *Bebius* Pascoe, 1865, *Lacordairina* Vives, Sudre, Miles & Cazares, 2011, *Lygesis* Pascoe, 1864, *Phantissus* McKeown, 1940, *Strongylurus* Hope, 1835 and *Tya* McKeown, 1940. The cladistic analysis on the relationships of the genera of Australian Strongylurini carried out by Calder (2000) allows us to clarify a little about the accuracy of the placement of each genus in this tribe. His conclusion is that a first clade comprising *Phantissus*, *Exaeretiformis*, *Lygesis* and a second clade comprising *Opsidota*, *Strongylurus*, *Piesarthrius* and *Aprosictus* may together constitute a single higher clade that represents the tribe Strongylurini excluding the genus *Bebius*.
The results of the phylogeny of the genera and the historical analysis of the tribe enabled me to objectively choose the tribe Strongylurini for the placement of the genus *Aprosictus*.

Materials and methods

For about four years I have gathered specimens of this group from institutions, entomologist colleagues and with the use of the Internet. I was able to obtain good photographs of all types except for *Aprosictus duivenbodei* whose type was deposited at the Hessen Regional Museum (Darmstadt, Germany) but has not been located so far. According to the curator of the Museum, it is possible that the type was placed with "non-type" specimens. Nevertheless, all the species known hitherto could be studied and many new species have been found. Overall, very few cerambycids in this group appear to have been captured until now. I therefore did not want to dissect specimens to examine the genitalia, in order to preserve as much as possible insects that are often unique. Moreover, examination of the external characters alone is sufficient to separate the different species. Work was carried out using a binocular microscope equipped with a 40/1 magnification zoom.

First, I describe the new genus *Duplipectus* gen. nov. followed by the description of the four species that compose it. Then I provide a key to the males of species of this genus. In a second step, I redescribe the genus *Aprosictus*, followed by the description of the fourteen species that compose it. I propose then a key to the males of species of this genus.

Distribution maps of the species are provided for each genus.

Abbreviations used in the text:

ANIC – Australian National Insect Collection, Canberra, Australia;
AWC – Collection Andreas Weigel, Wernburg, Germany;
DTC – Collection Dmitry Telnov, Rīga, Latvia;
GCC – Collection Gérard Chemin, Champigny-sur-Marne, France;
LBC – Collection Larry Bezark, Sacramento, U.S.A.;
MNHN – Muséum national d'Histoire Naturelle, Paris, France;
NBCN – Naturalis Biodiversity Center, Leiden, the Netherlands;
PJC – Collection Philippe Jacquot, Montboucher-sur-Jabron, France;
SAM – South Australian Museum, Adelaide, Australia;
SMNH – Swedish Museum of Natural History, Stockholm, Sweden.

***Duplipectus* gen. nov.**

Type species: *Aprosictus bilineatus* Ritsema, 1881

Derivatio nominis: From the Latin "dupli" (double) and "pecten" (comb). Refers to the lobes of the antennae.

Description: Male. Length: 18.5-30.1 mm. Body elongate, head and pronotum black, elytra and legs with brown to black tones. Head as wide as the pronotum. Eyes very large, coarsely faceted and greatly enveloping the head in such a way that the upper ocular lobe is divided in two half-lobes which surround the antennal tubercles on both sides. The two posterior half-lobes are contiguous, only separated by the two pilose stripes which surround the eyes. The frons is thus reduced to a small area between the antennal tubercles, the clypeus and the two anterior half-lobes. The gula is also very reduced between the two lower ocular lobes. Apical half of mandibles strongly curved. Maxillary palps thin and elongate. Antennal tubercles protruding and contiguous. Antennae slightly exceeding the apex of the elytra. Scape short, feebly curved and strongly dilated, club-shaped, not exceeding the base of the head. Pedicel very reduced (about 1/7th of the length of the scape). Antennomeres 3 to 10 cylindrical and progressively longer (8 and 9 of substantially the same length). Eleventh segment of antennae strongly inwardly curved, laterally compressed, lamellate and very long (4 to 6 times the length of the tenth segment of antennae). Antennomeres 3 to 10 are each provided at their apex with two elongate lobes bristling with very fine bristles. Antennae with externals lobes lamelliform,






identical to eleventh segment of antennae. Internal lobes are filiform. Lamelliform lobes are of the same length or slightly shorter than the apical segment of antennae. The filiform lobes are directed downwards and are shorter than the lamelliform one. The pronotum is feebly transverse, weakly convex centrally of the sides and strongly punctate on the entire surface, sometimes except for poorly delimited smooth areas on the disc. Pronotum bordered on each side by a thin longitudinal white pilose stripe. Elytra shiny, regularly narrowed towards the apex which may be armed with spines. The basal half of the elytra is coarsely punctate, the apical half is practically smooth. Legs short. Femora dilated, metafemora do not reach apex of the elytra. Procoxae prominent, prosternal process narrow and strongly tilted backwards. Mesocoxae flattened, mesosternal process emarginate apically. Mesepisternum and mesepimeron generally totally and densely covered with white pilosity.

Sexual dimorphism: Female, body length 27.3 mm. Same colour as the male. Head narrower than the pronotum. Antennae of eleven segments reaching the centre of the elytra. Scape short and claviform. Pedicel reduced. Antennomeres 3 to 11 flattened, 3 is longer than the scape and than each of the seven following segments of antennae. Segment 11 slightly longer than segment 3. Antennomeres 3 to 10 serrate externally at the apex. Antennomeres 4 to 10 substantially of the same length. Pronotum distinctly transverse. Elytra parallel with the apex identically armed as male. The other characters are similar to those described above for the male.

Differential diagnosis: This genus is intermediary between the genera *Aprosictus* and *Piesarthrius*. Males differ from *Aprosictus* by biflabellate antennae, lamelliform lobes, antennomere 3 always shorter than 4, white thick pilosity on all or part of mesepisternum and mesepimeron; they are differentiated from *Piesarthrius* by biflabellate antennae and antennal lobes bristling with fine setae. Females differ from *Aprosictus* by serrate antennae with short and stubby antennomeres, white thick pilosity on all or part of mesepisternum and mesepimeron and by two thin lines of white pilosity on the pronotum; they are differentiated from *Piesarthrius* by a scape much shorter than antennomere 3.

***Duplipectus bilineatus* (Ritsema, 1881) comb. nov.** (Plate 48 figs 1-3)

Holotype ♂ NBCN: 4 labels: white "Aprosictus bilineatus Rits. type", white "Bernstein Waigeoe.", red "Aprosictus biliniatus [sic!] Ritsema, 1881 ZMAN type COLE.1393.1", red "TYPE" framed.

Additional material 1♂ PJC: Indonesia, Halmahera island, V.1991, Len Hart leg., local coll.

Description: Male. Length 30.1 mm. Humeral width 8 mm. Body elongate, shiny. Head, pronotum and thorax black. Elytra yellow-brown on the apical half, brown on the disc. A black central oblique stripe separates the elytra in two equal parts. Another black stripe borders laterally the elytra on their anterior half from the humeri to the central stripe. Abdomen dark-brown. Legs mostly black at the top and mostly dark brown thereafter. Head short, roundish. Eyes very large, coarsely faceted. Antennal tubercles protruding, contiguous, ending in a blunt tip at the rear. Neck shallowly punctate. Frons smooth, glabrous. Gula deeply and densely punctate. Pilosity dense, thick, short, yellow around the eyes. This pilosity is narrow around the lower ocular lobes and the antero-upper half-lobes, larger around the postero-upper half-lobes and completely disappears behind the eyes. Similar pilosity sparsely overlays the antennal tubercles and the mouthparts. Antennae of eleven rounded segments except the last which is flattened in the form of a very elongated lamella. Antennae slightly exceed the apex of the elytra. Scape strongly dilated, club-shaped. Relative dimensions of antennal segments are: 2.34-0.34-1.00-1.17-1.37-1.67-1.97-2.31-2.26-2.90-16.50. 11th segment of antennae longer than 2 to 10 combined. Segments 3 to 10 are provided with two long lobes at their apex as described above in the genus. Antennomeres 1 and 2 finely punctured, covered with sparse yellow short bent pilosity. Antennomeres 3 to 11 densely covered on the upper side with yellow bent setae, thinner than those of segments 1 and 2. Other surfaces of the antennae, lamelliform and filiform lobes, are covered with very fine bristly setae. Pronotum longer than broad. Anterior margin straight, posterior margin sinuate. Sides broader in the middle, regularly narrowed forwards, slightly concave backwards. Punctation abundant on the entire surface, except for a little glossy area on the disc and two small elevations on either side of the middle of the base. Pilosity sparse, decumbent, short, yellow, except for the lower sutures fringed with yellow dense setae. A fine longitudinal line (0,6 mm broad) of short bent white pilosity is on each side of the disc. Scutellum triangular with round summit, covered at the centre with an abundant short bent thick yellow pilosity. The pilosity is very fine and sparse on the edges. Elytra uniformly narrowed






from the base to the apex, which is extended with two apical spines: one short along the suture and a second one twice as long, placed more laterally. Anterior half of the elytra abundantly and deeply punctate up to the oblique black stripe. Apical half very finely punctured or smooth. A fine scattered white pilosity mainly covers the sides, the suture, the apex and the humeri of the elytra. Legs short, metafemora distant from the apex of the elytra. Femora clavate. Tibiae flattened. Legs covered with fine white or yellow tomentum, recumbent on the femora, longer and bristly on the tibiae. Prosternum deeply and densely punctate. Mesosternum with a triangular elevation in its centre; the median line of the triangle is deeply grooved. Metasternum densely and finely punctured. Abdomen smooth, covered with fine decumbent yellow tomentum. Mesepimeron and metepisternum totally covered with abundant white pilosity, thereby forming two clearly visible bands on the sides of the thorax. Last sternite feebly emarginate. Mesepisternum and metasternum covered with a dense fine yellowish pilosity. Prosternum sparsely covered with a decumbent yellow short pilosity.

Sexual dimorphism: Female unknown.

Differential diagnosis: This species is closely related to *D. degroofi* sp. nov. and *D. buruensis* sp. nov., but it is mainly distinguished from these species by its scutellum with thick setae on a central stripe and thin setae on the sides, an elytral black oblique stripe going up to the humeral edge but not going down to the apex of the elytra, and the 11th segment longer than 2 to 10 combined.

***Duplipectus buruensis* sp. nov.** (Plate 48 figs 4-5)

Holotype ♂ PJC: Indonesia, Buru, Ilat vill. env., Remajat Mt, 200-300 m, 5-18.I.2013, Arnost Kudrna leg., Stanislav Jakl coll.

Paratype 1 ♀ PJC: same data as the holotype.

Derivatio nominis: Toponymic. This species is named in relation to the place of its capture: the island of Buru in the province of Maluku.

Description: Male. Length 22.9 mm. Humeral width 6.2 mm. Body elongate, shiny. Body dark brown and black coloured except for the elytra which are brown on the anterior half and yellowish-brown on the posterior half. Head rounded, short, as wide as the pronotum. Mandibles protruding, strongly curved on the apical half. Eyes large, coarsely faceted, totally covering the cheeks. Frons punctured near the tubercles, smooth at his centre and vertically elevated over the densely punctured clypeus. Vertex narrow and punctate. A deep furrow is present forwards the vertex between the postero-upper ocular half-lobes. Gula narrow (ratio width gula to width of the adjacent ocular lobe = 0.3) and punctate. Antennal tubercles protruding, very emarginate, slightly punctate and terminated in a blunt point towards the rear. Pilosity short, recumbent, yellow, dense between tubercles, eyes, on the sides of the vertex, at the base of the tubercles and around the lower ocular lobes. Pilosity scattered on the clypeus, the top of the tubercles, the gula and absent behind the eyes. Antennae cylindrical, of eleven antennomeres. Segment 11 widens in flattened lamella on its apical ¾. Extremity of antennomeres 3 to 10 nodulous and provided with two long lobes as described above in the genus. Scape short, dilated, club-shaped apically. Pedicel very reduced. Relative dimensions of antennal segments are: 1,87-0,28-1.00-1.44-1.58-1.72-1.94-2.02-2.22-2.51-12.80. Segment 11 as long as segments 5 to 10 combined. Antennomeres 1, 2 and extremity of antennomeres 3 to 10 shiny. Upper side of antennae covered with short recumbent pilosity; other antennal sides and the whole surface of the lobes covered with thin erect setae. Pronotum shiny, slightly transverse (length/width = 0.9), with front margin nearly straight and basal margin clearly sinuated. Sides convex forwards and concave backwards. Disc wrinkled-punctured, separated from the sides by two longitudinal lines of white pilosity wider at the base than at the apex of the pronotum. Punctation dense and deep outside the two white lines. Edges of the pronotum borders with a fine stripe of white and yellow pilosity. The rest of the surface is covered with very sparse short recumbent setae and long erect bristles. Scutellum triangular with rounded apex and a central longitudinal stripe of short recumbent gold pilosity. It appears dull, black and glabrous on each side of the stripe. Elytra shiny, convex, regularly narrowed from the base to the apex. Elytra terminated with a central spike. Sutural edges of the elytra divergent at the apex and terminated with an acute angle rejoining the spike by following a concave curvature. A black oblique stripe separates the elytra into two equal parts. The anterior part is brown and densely punctured with a white recumbent seta into each punctation. The posterior part is yellowish and mainly smooth and glabrous with only a few punctations provided with a seta. The central black oblique stripe does not reach the edges of the elytra. A brown and black elongated macula covers the humeral angle and the lateral edge of the first third of the elytra. A thin black line borders the external margin of the posterior third of the elytra, widens





at the apex before reaching the extremity of the suture. Legs short, dark-brown with black joints. Femora clavate and flattened. Tibiae straight. Pilosity very sparse, short, recumbent on the femora, erect on the tibiae. Underside shiny dark-brown to black. Prosternum punctured with narrow process between protruding fore coxae. Mesosternum very declivitous and punctured, emarginated rearwards. Metasternum rough, covered in front with a thin scattered tomentum, becoming denser towards the apex. Mesepisternum and mesepimeron densely and totally covered with a white pilosity. Last visible sternite regularly rounded at the apex without emargination.

Sexual dimorphism: Female, body length 27.3 mm. Humeral width 7.6 mm. Head narrower than pronotum. Antennal tubercles slightly raised without blunt point towards the rear. No deep groove in front of the vertex. Gula wide (ratio width gula to width of adjacent ocular lobe = 0.47). Antennae short, reaching the middle of the elytra. Scape short, claviform. Pedicel densely pilose. Antennomere 3 longer than each of the seven following segments. Antennomere 11 slightly longer than segment 3. Antennomeres 4 to 10 short and practically of the same length. Antennomeres 3 to 11 flattened; 3 to 10 are serrate externally at the apex. Pronotum transverse (length/width = 0.8) with two longitudinal stripes of white pilosity interrupted in the middle on each side of a glabrous discal smooth longitudinal line which do not reach the front and the posterior margin. Elytra very convex, parallel and rounded at the apex. The apical spike is in the axis of the sutural quarter of the elytra. Elytra regularly and shallowly punctured with a seta in the centre of each puncture on its apical light coloured half. Metasternum irregularly punctured, covered with short setae. Mesepisternum and mesepimeron densely and totally covered with white and yellow pilosity. Last sternite with straight apical margin. Other characters are similar to those described above for the male.

Differential diagnosis: This species, close to *D. degroofi* sp. nov. and *D. bilineatus* (Ritsema, 1881) can be distinguished, besides its geographical location, by the raised frons, the scutellum having a central pilose stripe, the black oblique elytral stripe not connected to the lateral stripe, the fifth visible sternite without emargination and by the eleventh antennomere equal to 5 to 10 combined in male.

***Duplipectus degroofi* sp. nov.** (Plate 48 fig. 6)

Holotype ♂ PJC: Indonesia, north of Seram, Saleman village, XII.2015, Benny De Groof leg., local coll.

Derivatio nominis: Patronymic. Named in thanks to Mr De Groof (Belgium) who warmly offered me this magnificent specimen.

Description: Male. Length 28.7 mm. Humeral width 7.3 mm. Body elongate, shiny. Head, pronotum, thorax and upper side of the legs black. Elytra brown bordered with a wide black stripe from the shoulders to the elytral apex. A second oblique stripe begins in the middle of the elytra close to the suture and reaches the first black stripe a bit further back. A small brown elongated area is visible in the middle of the first black stripe, against the external edge of the elytra. Abdomen and outer side of the legs are dark brown. Head short, roundish. Eyes enormous, coarsely faceted. Antennal tubercles protruding, contiguous, terminated in a blunt point towards the rear. Neck abundantly punctate. Frons smooth and glabrous in the middle, punctured on the outline. Gula deeply and densely punctured. Clypeus irregularly punctured near the frons, smooth near the labrum. A fine fringe of short yellow setae borders the eyes both above and below but not on the sides and back of the head. This fringe is thicker between the postero-upper half-lobes. The same pilosity also sparsely covers the base of the antennal tubercles and the punctate frons surface. Antennae of eleven cylindrical antennomeres except the last which is flattened, elongated and lamella-shaped. The antennae slightly exceed the apex of the elytra. Scape strongly club-shaped and dilated. Relative dimensions of antennal segments are: 2.26-0.35-1.00-1.45-1.63-1.93-2.14-2.21-2.21-2.79-13.93. 11th segment of antennae shorter than 4 to 10 combined. Segments 3 to 10 are provided with two long lobes at their apex as described above in the genus. The two first antennomeres are smooth with few scattered setae. The upper side of the nine following antennomeres is matt, except the glossy nodular apex of the antennomeres 3 to 10. The other surfaces of the antennae, as well as the surfaces of the lamelliform and filiform lobes, are covered with very thin bristly setae. Pronotum feebly transverse (length/width = 0.9). Front margin straight, basal margin sinuate. Sides larger in the middle, anterior half convex, posterior half slightly concave. Punctation deep and abundant on the sides but sparse and fine on the disc, which has small smooth areas. Presence of a thin longitudinal stripe (0.4 mm wide) of short decumbent white pilosity on each side of the disc. Those stripes are interrupted in the middle. The rest of the pronotum have a sparse yellow decumbent pilosity, except the prosternal sutures which are bordered with a fringe of yellowish-white dense setae. Scutellum









triangular with a round top and densely covered with a thick decumbent short yellow pilosity. Elytra gradually narrowed to the back and terminated by two apical spines: a short one along the suture, another three times longer and a little more to the outside. Anterior half of the elytra strongly punctured to the black oblique stripe. Apical half very finely punctured or smooth. A very sparse white thin pilosity covers the elytra into single piliferous punctures. Legs short. Metafemora distant from the apex of the elytra. Femora clavate. Tibiae flattened. Femora covered with fine and decumbent yellow or white bristles, similar type bristles are longer and upright on the tibiae. Underside densely and deeply punctured at the level of the prosternum and mesosternum; densely and finely punctured at the level of the metasternum. Abdomen smooth and covered with a fine decumbent yellow tomentum. Mesepimeron and metepisternum totally covered with an abundant white pilosity forming two very visible white stripes on the sides of the thorax. Last sternite feebly emarginate.

Sexual dimorphism: Female unknown.

Differential diagnosis: This new species is closely related to *D. bilineatus* (Ritsema) and *D. buruensis* sp. nov., but it is mainly distinguished from these two species by a glabrous upper side of the antennae, an 11th antennomere shorter than 4 to 10 combined, an elytral black stripe along the whole length of the side of the elytra and a mesosternum with a triangular elevation.

***Duplipectus truncatus* (Aurivillius, 1916) comb. nov.** (Plate 48 figs 7-9)

Holotype ♂ SMNH: 20 mm, 7 labels: white “Sepik Fluss”, white “Birger Mörner”, white “Nya Guin.”, white “Type.”, white “NHRS-JLKB000020613”, blue “9140E92+”, red “Aprosictus truncatus AURIVILLIUS 1916 det. J. Ferrer”.

Additional material: 4♂ PJC: Indonesia, West Papua, Mamberamo district, 28 km from Marikai, Van Rees Mountains, 19-26.VI.2014, alt. 135 m, S-02.17.708°/E-137.05.401°, Gil Bretschneider leg.; 1♂ PJC: Indonesia, West Papua, Dabra env., Buare river valley, 05-16.I.2009, alt. 100 m, Alexey N. Zamesov & Viktor Sinjaev leg.

Description: Male. Length 18.5-23 mm. Humeral width 4-5.4 mm. Body mainly black, shiny, elongated with four longitudinal narrow stripes on the elytra: one brownish stripe along the suture, behind the scutellum; one yellowish brown stripe in the middle and in the anterior half of the elytra; one yellowish white stripe against the suture in the apical half of the elytra (this stripe can be very reduced and then only visible in its apical part); one beige stripe in the middle of the elytra, beginning at the 3/5 and reaching the 4/5 of the length of the elytra. Head short, spherical. Eyes enormous, coarsely faceted. Jowls non-existent. Upper ocular lobes contiguous at the rear of the antennal tubercles. Lower interocular space reduced to a coarsely punctured gula less than ½ mm wide. Neck densely punctured on the top and smooth on the underside. Frons only punctured near the antennal tubercles, smooth against the clypeus which is abundantly and deeply punctured. Antennal tubercles contiguous, feebly punctured. Mandibles externally punctured, covered with few thin bristles. Antennal tubercles with dense pilosity of short decumbent thick and whitish setae forwards, sparsely identical setae at the rear. Lower and upper interocular spaces as well as the half-moon shaped space between antennal tubercles and eyes, are bordered with fine yellowish fringe of setae. Antennae smooth of eleven cylindrical segments except for the 11th which is flattened elongated and lamella shaped. Antennae slightly surpassing the elytral apex. Scape short, club-shaped, dilated. Relative dimensions of antennal segments are: 1.73-0.27-1.00-1.52-1.73-1.99-1.86-1.79-1.66-2.33-10.07. Antennomere 11 longer than 6 to 10 combined. Segments 3 to 10 with two long lobes at their apex as described above in the genus. Antennomeres 1 and 2 present a very reduce pilosity of some very fine and short setae. The rest of the antennae (with the lobes) is entirely covered with fine bristly setae uniformly arranged. Pronotum slightly transverse with a straight front margin and a sinuate posterior margin. Sides broader in the middle, progressively and linearly narrowed forward and backward. Punctation dense and deep on the whole surface. Pilosity limited to few brownish decumbent bristles. Two longitudinal discontinuous (short interruption slightly in front of the middle of the pronotum) stripes of dense short bent white pilosity on each side of the disc. A short third longitudinal stripe, measuring one third of the pronotum length, is in the centre of the base of the pronotum. The lower sutures of the pronotum are fringed with short decumbent yellowish setae. Scutellum rounded and very densely covered with short decumbent thick beige pilosity. Elytra sub-parallel, apex truncate without spine, punctation deep on the basal half and suddenly erased on the apical half. Pilosity short, sparse, thick, decumbent mainly along the suture and in the sides of the elytra. Legs short. Femora flattened and claviform. Tibiae shorter than the femora. Pilosity sparse and white on the external sides of the legs, dense fine









and long on the undersides and internal sides of the legs. Ventral surface spotted with small areas of white pilosity: one such area longitudinal and median in the centre of the strongly punctured prosternum; one other small area on the base of the mesepimeron; one longitudinal short and median on the anterior tip of the mesosternum, one bigger covering the whole apical half of the metepimeron, three to six spots on the second, third and fourth visible sternites. Mesosternum densely punctured. Metasternum finely punctured. Fifth sternite emarginate with rounded sides.
Sexual dimorphism: Female unknown.

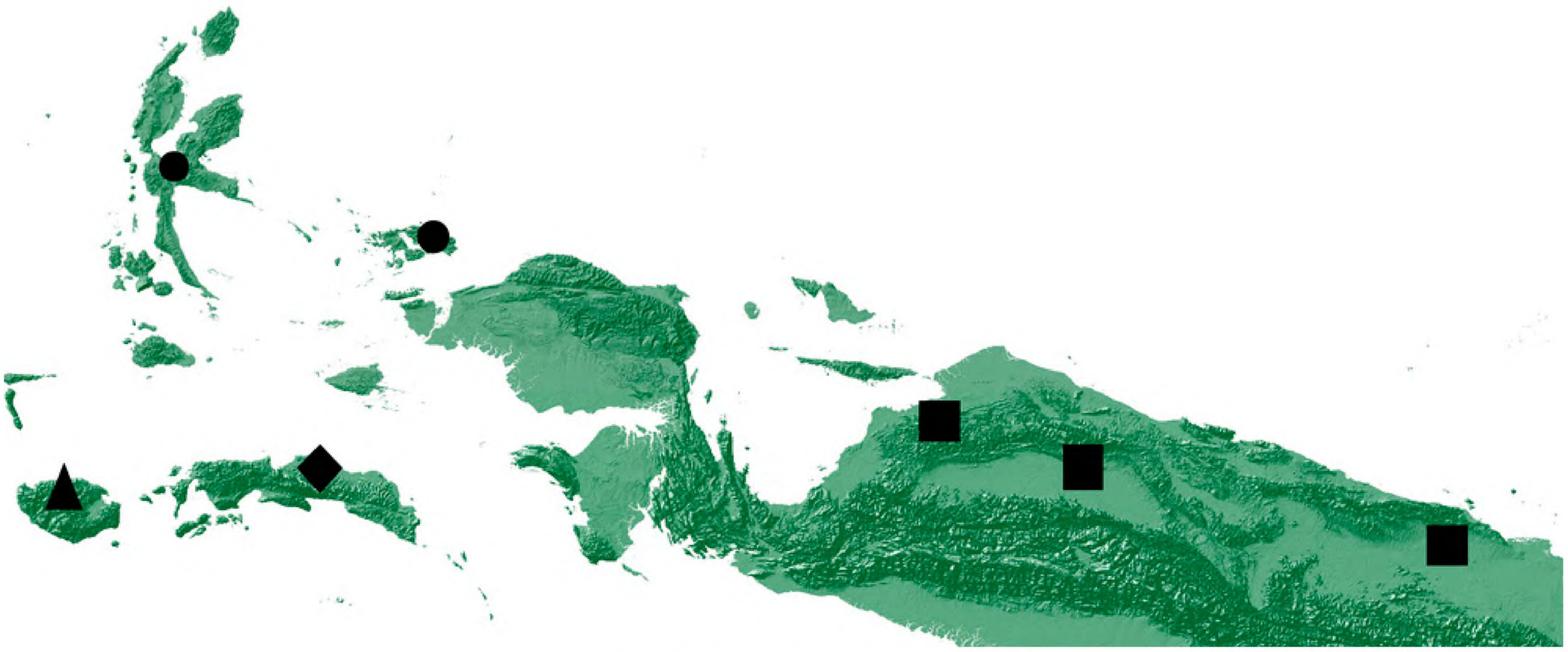
Key to males of genus *Duplipectus*

1 Apex of the elytra truncate (New Guinea) .... *D. truncatus*
– Apex of the elytra with tooth 2
2 Black oblique stripe on elytra extended to the humeri 3
– Black oblique stripe on elytra not extended to the humeri (Buru) ..... *D. buruensis* sp. nov.
3 Black lateral stripe reaches middle of elytra, 11th antennal segment longer than 4 to 10 combined (Halmahera, Waigeo) ..... *D. bilineatus*
– Black lateral stripe reaches apex of elytra, 11th antennal segment shorter than 4 to 10 combined (Seram) .... *D. degroofi* sp. nov.

Genus *Aprosictus* Pascoe, 1866

Type species: *Aprosictus duivenbodei* (Kaup, 1866)

Description: Male. Length: 17-30 mm. Body brown to dark brown, elongated. Head as wide as, or slightly less wide, than the pronotum. Mouthparts prominent, snout shaped. Mandibles fine and curved. Maxillary palps fine and long. Eyes large, coarsely faceted with an upper lobe divided into two half-lobes circling the antennal tubercles which are protruding, deeply emarginate and terminated backwards by a blunt tip. Eyes bordered with a thin fringe of short, dense and decumbent setae, which can be severed behind the eyes, and which totally or partially covers the antennal tubercles. Pilosity is also present on the other parts of the head but sometimes excludes some glabrous areas on the frons, the vertex or the gula. Antennae fine and long of eleven segments, slightly shorter to slightly longer than the apex of the elytra. Scape short, strongly dilated and slightly arched. Pedicel very reduced, measuring less than one millimetre. Antennomeres 4 to 11 generally gradually extending, the third segment may be sometimes longer than the following. Antennomere 11 very large, often much longer or equal to the antennomeres 2 to 6 combined. Antennomeres 3 to 10 are provided with a long external apical protrusion. Those filiform lobes, covered with short bristly setae, sometimes exceed the apex of the antennae. Pronotum slightly transverse, cylindrical or cylindro-conical with thinning towards the apex. It possesses three glabrous and smooth areas: a median longitudinal stripe and two protuberances



Map 1. *Duplipectus* gen. nov. distribution.
Legends: circles – *D. bilineatus* (Ritsema, 1881), triangle – *D. buruensis* sp. nov., rhomboid – *D. degroofi* sp. nov., squares – *D. truncatus* (Aurivillius, 1916).






situated on either side of the base of the pronotum. Sides of the pronotum showing strong punctations often concealed under dense pilosity. Elytra are either sub-parallel or regularly narrowed backwards. The base is deeply and abundantly punctured. This punctation progressively decreases towards the apex, whose surface is slightly granulous. Elytra always have at least one spine, sometimes tiny. A black macula is often present in the centre of the elytra. Legs short. Femora clavate, flattened and shorter than the straight tibiae. Apex of metafemora distant from the apex of the elytra. Lower surface entirely covered with a fine tomentum, except for a well-marked axial line at the base of the metasternum and for two fine stripes which underline this base from either side of the axial line. Prosternum densely punctured and elevated with a strongly declivitous process backwards. Fore coxae protruding with very narrow process. Mesosternum very declivitous except for the sub-horizontal process.

Sexual dimorphism: Female body elongate, same colour as the male. Length 21.5-37 mm. Similar to the male except for the antennae and the elytra. Antennae of eleven segments. Scape strongly dilated. Pedicel very reduced. Antennomeres 3 to 10 serrate. Segment 3 longer than each of the seven following segments. Antennomeres 4 to 11 are laterally widened over their entire length, which gives them a dorso-ventral flattened appearance. Antennae of variable length according to species: generally exceeding the middle of the elytra but reaching apex in some species. Elytra parallel and generally without apical spine.

***Aprosictus acutipennis* sp. nov.** (Plate 48 fig. 10)
Holotype ♂ PJC: Indonesia, Sumatra, 2014, Silvia Jakusch leg.

Derivatio nominis: from Latin “acutus” (sharp) and “penna” (wing) relative to the narrowness of the extremity of the elytra.

Description: Male. Length 31.5 mm, Humeral width 7.8 mm. Width before the curvature of the apex of the two elytra 4.5 mm. Body elongate red brown with the head, the pronotum and the scapes black. Head of the same width as the base of the pronotum. Eyes very expanded, covering the greater part of the head except for a small area between the upper and the lower ocular lobes. Eyes totally bordered with a fringe of short decumbent dense yellow setae. This pilosity rises on the antennal tubercles and descends on the clypeus and the external sides of the mandibles except for the centre of the frons, which is almost without punctation as opposed to the very densely punctured gula. Neck densely punctured on the top. Vertex with a fine smooth longitudinal stripe. Neck smooth on the underside. Antennal tubercles strongly emarginate, and blunt jagged toward the rear. Antennae fine and slightly exceed the apex of the elytra. Scape short, stocky, not exceeding the head. Pedicel very reduced. Relative dimensions of antennal segments are: 1.98-0.38-1.00-1.00-1.03-1.19-1.35-1.33-1.57-1.95-8.68. Segment 11 is as long as antennomeres 3 to 9 combined. Antennomeres 3 to 10 bear a long feathery lobe in apical and external position. These lobes, apart from those of antennomeres 3 and 4, exceed the extremity of the antennae. The latter are covered on their entire circumference with small short decumbent setae. Fine short bristles cover the undersurface of the antennae and the whole surfaces of the lobes. Pronotum conical, narrower at the apex, as long as the width of the base, totally covered with a dense short decumbent yellow pilosity apart from three smooth and glabrous areas as follows: a fine longitudinal stripe on the disc and two triangular protuberances on either side of the middle of the base. Surface ridged and punctured, hardly visible under the pilosity. Scutellum triangular with round tip, densely covered with a yellow decumbent pilosity. Elytra highly convex, regularly narrowed from the shoulders to the curvature before the apex. Ratio of bi-humeral width to widest over the width before the apical curvature = 1.7. Apical spine offset from the suture. Surface of elytra deeply and densely punctured on the basal half, very light and very fine on the second half. Elytra brown on the basal quarter and rapidly turn yellowish-brown on the extremity. Elytra bordered with a thin black line from the curvature before the apex to the suture. A little chevron-shaped black spot with the tip pointing forward is located in the centre of the elytron. This chevron is farther from the outer edge of the elytra than from the suture. Pilosity yellowish-beige, sparse and very regular. All setae easily visible and individually distinguishable. Legs short with flattened and clavate femora longer than the tibiae. These are almost straight and somewhat flattened. Legs brown with the top of the femora black for a ninth of their length. Pilosity fine, whitish, uniformly arranged except for the inner surfaces of the meta- and mesofemora, which are smooth and glabrous. Pilosity dense on the femora and sparse on the tibiae. Underside abundantly covered with a fine yellowish tomentum on the prosternum and the mesosternum, whitish on the metasternum and the






abdomen. The pilosity is however sparser on the metasternum and the mesosternum. Prosternum and mesosternum strongly punctured. Prosternum strongly raised between protruding and reconciled coxae (space between the coxae = 0.35 mm). Mesosternum very declivitous with a U-shaped emarginate process. Metasternum with three glabrous and smooth lines: one line on the median suture, one line along the rear edge on either side of the centre without ever reaching the median suture. Fifth visible sternite lengthily and shallowly emarginate.

Sexual dimorphism: Female unknown.

Differential diagnosis: This species is very close to *A. duivenbodei* (Kaup, 1866) but it is distinguishable by its narrower gula with a ratio of width of gula to width of adjacent lobe equal to 0.36 versus 0.67 for *A. duivenbodei* (Kaup); by a beige abdominal pilosity, which is yellow for *A. duivenbodei* (Kaup); by a different antennal formula with segment 3 = 4 and 11 = 3 to 9 combined, while *A. duivenbodei* (Kaup) has the segment 3 < 4 and 11 > 3 to 9 combined. *A. acutipennis* sp. nov. is also very close to *A. dilatoscapus* sp. nov. but can be distinguished from it by a thinner scape having a ratio of length to width (only the globular part taken at the widest) equal to 2.45 versus 2.16 for *A. dilatoscapus* sp. nov.; by its narrower gula with a ratio of gula width to adjacent ocular lobe width of 0.36 versus 0.49 for *A. dilatoscapus* sp. nov. and by the denser pilosity of the pronotum.

***Aprosictus armellae* sp. nov.** (Plate 49 fig. 1)

Holotype ♂ PJC: Indonesia, West Papua, Sorong, II.1999, Hasan Agusyanto leg, local coll.

Derivatio nominis: Patronymic. I dedicate this new species to my wife Armelle in recognition of her support and all the sacrifices she makes in order for me to pursue my passion for entomology.

Description: Male. Length 29 mm. Humeral width 8 mm. Body elongate, dark brown. Head and pronotum blackish brown. Apical teeth of the elytra and joints between tibiae and femora black. Head short with very large coarsely faceted eyes. The postero-upper ocular half-lobes come closer to the top, leaving a narrow and glabrous interocular space, slightly wider than the interantennal groove. Lower ocular lobes completely cover and hide the cheeks and the major part of the gula. This, as well as the vertex, are roughly wrinkled-punctured. Frons and clypeus densely punctured and pilose. Clypeus very short with the sides smooth and glabrous. Eyes bordered with a fringe of short decumbent yellow golden pubescence which ascends densely on the whole surface of the antennal tubercles. Antennae fine with eleven cylindrical segments, exceeding the apex of the elytra. Scape globose. Second segment of antennae very reduced. Segments 3 to 10 with long lobes in postero-external position. Each protrusion is cylindrical and exceeds the extremity of the eleventh segment of antennae, except those of the segments 3 and 4. Segment 11 stretched in the form of an elongated “S” which is as long as antennomeres 2 to 10 combined. Relative dimensions of antennal segments are: 2.10-0.39-1.00-1.00-1.13-1.23-1.39-1.43-1.63-2.11-11.33. Antennae totally covered with a short dense pilosity, initially golden-yellow on antennomeres 1 and 2, then yellowish-white on the other antennomeres. The entire periphery of the lobes is covered by fine upright setae. Pronotum slightly transverse (length/width = 0.94). Front margin straight and posterior margin slightly sinuated, preceded by a thin transverse groove. On each side of the middle of the base are two oblique flat protuberances which attenuate and disappear on the sides of the pronotum. Coarsely wrinkled-punctured shiny disc with a median smooth line of poorly defined contour. Each punctation of the disc has a yellow golden decumbent seta at its centre, whereas the sides of the pronotum are more finely punctured on a matt ground and show very irregular white pilosity, sometimes dense, sometimes non-existent. Scutellum as long as wide, characterized by a central yellow golden decumbent pilosity bordered by a whitish pilosity except for the anterior edge. Elytra sub-parallel on 9/10th of their length then abruptly narrowed to the apex. Elytral suture divergent at the apex and terminated with a spine. Elytra coarsely punctured on the basal half and becoming progressively smoother towards the apex. Elytra fairly regularly covered with a long decumbent sparse yellow golden pubescence. Elytra with two smooth oblique glabrous pseudo-carina running from the shoulders to the elytral suture near the apex. The internal pseudo-carina exceed ¾ of the length of the elytra, the external pseudo-carina exceeds 9/10th of the length of the elytra. Legs short. Femora clavate, covered with thin decumbent dense yellow pilosity. This pilosity appears whitish-yellow on the posterior femora. Metafemora reaching the apical quarter of the elytra. Tibiae shorter than the femora and less densely covered with bristly whitish-yellow setae. Lower surface entirely covered with a dense pubescence except for a fine glabrous smooth median metasternal stripe widening to the posterior edge and for two






lines running from the postero-external edge of the metasternum, lying upon the posterior edge for half of its length then obliquely ascending frontwards to the centre of the metasternum, without reaching the smooth median stripe. Prosternum and mesosternum strongly punctured. Procoxae very protruding and contiguous (0.3 mm between the coxae). Prosternum very declivitous behind the coxae. Mesosternum with a longitudinal elevation in the centre of its process. Mesosternum less pilose at the centre than the other ventral areas. Sternite VII very feebly emarginate in the middle.
Sexual dimorphism: Female unknown.
Differential diagnosis: This species is easily distinguished from the others with its immaculate elytra covered with long curled hairs and its pronotum without dense white pubescence.

***Aprosictus dilatoscapus* sp. nov.** (Plate 49 fig. 2)
Holotype ♂ PJC: Indonesia, West Sulawesi, Mamasa, VI.2014.
Paratype 1♂ GCC: Indonesia, Sulawesi, Puncak, 01.X.1999, local coll.

Derivatio nominis: from Latin "dilato" (broaden, spread out) and scape (first article of the antenna of an insect). Referring to the highly globose scape of this insect.
Description: Male. Length 29-30 mm, bi-humeral width 7.6 mm. Body elongate, reddish-brown to blackish. Elytra brown on their first third, yellowish brown otherwise. Head a little less wide than the pronotum. Eyes very large, coarsely faceted, bordered by an edging of fine golden yellow setae. Frons coarsely punctured, covered with identical pilosity except for a small central glabrous area. Antennal tubercles contiguous, masking the bottom of the central groove, covered with fine golden yellow setae except for the posterior blunt tip. Postero-upper interocular space entirely covered with the fringes of golden setae. Lower interocular space totally punctured and approximately half as wide than the adjacent ocular lobe. Vertex smooth, glabrous, bordered on each side behind the eyes with a distinctly punctured and pilose surface. A small smooth and glabrous elevation is visible between the base of postero-upper ocular half-lobes. Antennae long and thin, slightly exceeding the apex of the elytra. Scape short, strongly dilated for its entire length (ratio length/width = 2.16). Pedicel very short. Relative dimensions of antennal segments are: 1.96-0.31-1.00-1.11-1.20-1.34-1.45-1.42-1.62-1.93-9.87. Segment 11 longer than 3 to 9 combined. Segments 3 to 10 with long lobes in postero-external position. Lobe of segment 3 does not extend to the tip of the antennae, that of segment 4 arrives at the level of the apex of the 11th segment. Subsequent lobes protrude beyond the antennae ends and all arrive at substantially the same level. The lower surface of the antennae and the entire surface of the lobes are covered with stiff bristles. The other surfaces are covered with thin decumbent short setae. Pronotum conical, very slightly transverse, base 1.4 times wider than apex. Surface with short transverse anastomose wrinkles on the top, rugose-punctate on the sides. Pilosity golden, scattered, extremely fine, very short, with three glabrous and smooth areas: a longitudinal irregular wrinkled axial stripe on the disc and two triangular smooth protuberances on either side of the centre of the base. Scutellum with curvilinear edges densely covered with a golden yellow short fine pilosity. Elytra shiny, sub-parallel, abruptly narrowed at the apex. Elytra 2.7-2.8 times longer that wide. Apex terminated with a spine slightly offset from the suture. Elytra with a black oblique spot behind the middle. This spot is closer to the sutural edge than to the lateral edge without ever reaching both. The apical quarter of the elytra is externally bordered by a thin black stripe up to suture. Elytral pilosity yellow, thin, very short, decumbent and regularly spread over the entire surface including the central black spot. All setae originate in the hollow of a punctation that is deeper forwards than backwards of the elytra. Legs short, reddish-brown with apex of femora black. Underside of profemora heavily obscured. Femora clavate and laterally flattened. Metafemora reach $^{4}/_{5}^{th}$ of the elytra length. Lower surface entirely covered with a thin yellow duvet except for two glabrous and smooth lines at the postero-external edges of the metasternum. Procoxae protruding with very narrow process (0,3 mm wide). Prosternum strongly elevated and punctured. Mesosternum very punctured and declivitous apart the sub-horizontal process which finishes with a strong indentation between the mesocoxae. Last visible sternite without indentation.
Sexual dimorphism: Female unknown.
Differential diagnosis: This species is very close to *A. duivenbodei* (Kaup, 1866) and has often been confused with it in collections due to its identical geographical distribution. Without having seen the type for *A. duivenbodei* (Kaup), I faced the problem of deciding which of these two species had served as the type species for the genus, and which was new. The morphological differences are rather small and the original description of






A. duivenbodei by Kaup (1866) does not make it possible to decide. Fortunately as *A. duivenbodei* (Kaup) is the original species of the genus, the genus description gives a valuable clue. I quote from the description of *Westwoodia* relating to the pronotum: "Er zeigt überall kleine Querwülste, die ausser einem mittleren Laengstreifen und 2 nackten runden Flecken am Hinterrand mit groben Haerchen dicht bedeckt sind" [5]. In fact, the presence of a dense pronotal pilosity designates only one of these two similar species. Despite the main characteristic being a more visible elytral pilosity, which differentiates *A. duivenbodei* (Kaup) from *A. dilatoscapus* sp. nov. Other notable differences are: a globose scape (length/width = 2.16) for *A. dilatoscapus* sp. nov., while it is club-shaped (length/width = 2.5) for *A. duivenbodei* (Kaup); the presence of a small elevation in front of the vertex, between the base of the postero-upper ocular half-lobes for *A. dilatoscapus* sp. nov.; the lobe of the fourth antennomere which does not reach the extremity of the antennae in *A. duivenbodei* (Kaup).

***Aprosictus duivenbodei* (Kaup, 1866)** (Plate 49 figs 3-4)

Material examined: 1♂ PJC: Indonesia, West Sulawesi, Mamasa, II.2015, local coll.; 1♂ MNHN: Indonesia, North Sulawesi, with 2 labels: "Celebes. Menado." and "Ex-Musæo VAN LANSBERGE" in coll. James Thomson; 1♂ MNHN: Indonesia, Sulawesi, with 3 labels: "Aprosictus duivenbodei Kaup", "Célèbes" and "Ex-Musæo Mniszech" in coll. James Thomson; 1♂ & 1♀ [depository unknown]: Indonesia, South Sulawesi, Pulu Pulu, XII.1998, Alain Audureau leg.; 1♂ PJC: Indonesia, Central Sulawesi, Palolo village, 01°17.8'S/120°14.9'E, alt. 1250m, III.2017, local coll., Christopher Nock leg.

Description: Male. Length 22-32 mm, Humeral width 6-8 mm. Body elongate, reddish-brown to blackish. Elytra sub-parallel, suddenly narrowed at the apex. Apical half of the elytra brown. Head, pronotum, scape and sternum darker. Head as wide as the pronotum, almost fully covered by coarsely faceted eyes. Eyes bordered by a fringe of thin yellow golden setae which extend along the antennal tubercles and go down to the frons excluding a small central glabrous area and to the clypeus. Pilosity is present on the mouthparts including the external face of the mandibles. Neck with yellow-cream pilosity. Antennal tubercles jointed and masking the bottom of the central groove. Lower interocular space entirely punctured and 1,5 times narrower than the width of the adjacent ocular lobe. Vertex smooth and glabrous, bordered on each side behind the eyes by a clearly punctured and pilose area. Antennae long and thin, exceeding the apex of the elytra. Scape strongly globular club-shaped, reaching the anterior margin of the pronotum. Pedicel reduced. Relative dimensions of antennal segments are: 1.99-0.38-1.00-1.08-1.17-1.24-1.38-1.44-1.54-1.84-9.39. Antennomere 11 longer than 3 to 9 combined. Segments 3 to 10 flabellate in postero-external position. The lobes of antennomeres 3 and 4 do not extend as far as the extremity of the antennae, those of antennomeres 5 and 6 just reach the extremity of the eleventh segment. The following flabellae all extend equally beyond the apex of the antennae. Lower surface of the antennae and surfaces of the flabellae covered with upright bristles. Other antennal sides covered with thin decumbent short setae. Pronotum conical, as long as wide. Base 1.4 times wider than the anterior edge. Pronotum strongly punctured, covered with a dense pilosity of thin short decumbent yellow-cream setae identical to those of the neck. Three glabrous areas without punctations are visible: an axial irregular stripe on the disc and two triangular protuberances on each side of the middle of the base. Scutellum triangular, densely covered with short yellow golden pilosity. Elytra shiny, dark brown to yellowish brown sometimes black on the humeri. Elytra 2.7 to 2.8 times as long as wide. Apex terminates with a slightly off-axis spine of the suture. Elytron with a black oblique spot behind the middle. This spot is closer to the sutural edge than to the lateral edge, without ever reaching either. The apical quarter of the elytra is externally bordered with a thin black edging stopping at the suture. Pilosity of the elytra yellow, short, decumbent and regularly distributed over the whole surface, including the central black spot. Each setae originates in the hollow of a punctation which is deeper towards the front than towards the rear of the elytra. Legs short, reddish-brown with apex of femora black. Femora clavate, laterally flattened. Metafemora exceed ¾ of the length of the elytra. Fore and metatibia almost straight, mesotibia slightly arched. Lower surface entirely covered with a thin yellow tomentum except for two smooth and glabrous lines at the posterior edge of the metasternum. Fore coxae protruding with very narrow process. Prosternum punctate and strongly elevated. Mesosternum declivitous and punctate excluding the sub-horizontal process, which ends with a deep indentation between the

5 It presents all over small transverse wrinkles which are densely covered with coarse brisltes, except for a longitudinal median strip and 2 round glabrous patches on the posterior border.






mesocoxae. The lateral edges of this process form a raised bead. The front tip of the metasternum straightens prior to nesting in the indentation of the mesosternum. Last visible sternite markedly emarginate.

Sexual dimorphism: Female of identical colour to the male but of different shape. Length 37 mm, humeral width 10 mm. Elytra parallel, abruptly narrowed in arc at the apex, which terminates with an acute angle slightly off-axis from the suture. The apical third of the elytra is black bordered up to the apex. Antennae without ramifications, exceeding the middle of the elytra, reaching the base of the black elytral spot. Scape club-shaped dilated. Pedicel very reduced. Antennomeres 3 longer than 1 and 2 combined and longer than all the other antennomeres. Antennomeres 4 to 10 are progressively shorter. Antennomere 11 slightly shorter than 3. Antennomeres 3 to 9 are toothed in postero-external position. The whole surface of the antennae is covered with a short decumbent pilosity.

***Aprosictus exiguus* sp. nov.** (Plate 49 fig. 5)

Holotype ♂ PJC: Australia, West Australia, south of Kimberley, Broome env., XII.2010, local coll.

Paratypes 2♂ ANIC: Australia, West Australia, Wyndham, 15°28'S/128°6'E, 15.XII.1930, H. J. Willings coll.

Derivatio nominis: From Latin "exiguus" (small), referring to the small size of this species.

Description: Male. Length 17-18 mm, Humeral width 4-4.2 mm. Body elongate, brown with darker head and pronotum. Elytra marbled with brown, yellow and blackish colours. Internal sides of meta and mesofemora as well as external sides of profemora are sometimes blackened. Head with an elongated muzzle and encompassed by huge coarsely faceted eyes. Jowls non-existent. Antennal tubercles and gula deeply punctured. Ratio of width of gula to width of lower ocular lobe equal to 0.3. Frons and vertex lightly punctured on the outskirts and smooth in the centre. Neck shallowly punctured on the top, smooth and shiny on the outside and furrowed on the sides. The fringe of golden pilosity bordering the eyes is faintly demarcated, then non-existent rearward of the eyes. A sparse pilosity covers the rest of the head except for the smooth areas. Antennal tubercles not contiguous, separated by a fine shallow furrow. Tubercles protrude little and are strongly emarginated with a smooth and glabrous tip. Antennae cylindrical of eleven antennomeres not reaching the apex of the elytra. Scape short. club-shaped. slightly curved underside. Pedicel reduced. Relative dimensions of antennal segments are: 0.85-0.12-1.00-0.78-0.74-0.74-0.74-0.72-0.81-0.96-2.20. Antennomere 11 as long as 2 to 6 combined, widens and flattens out for the last third in the shape of a downwardly curved spatula. Antennomeres 3 to 10 show apical external lobes. The flabellum of the segment 3 reaches the extremity of the segment 10, that of segment 4 exceeds segment 10, that of segment 5 exceeds the first third of segment 11, that of segment 6 reaches the middle of segment 11, those of segment 7 and 8 reach two-thirds of the eleventh antennomere and those of segments 9 and 10 reach 9/10th of segment 11. Scape slightly punctured with short decumbent sparse pilosity. The underside of antennae and lobes are covered with thin, short, decumbent bristles of equal length. Bristles are absent from the upper side of the antennae, which are covered with very thin decumbent setae. Pronotum as long as wide, shiny. Sides regularly rounded. Anterior margin straight, basal margin sinuate. Disc red-brown, irregularly punctured covered with sparse pilosity. A small smooth elongated area with a poorly defined contour along the median line is on the basal half but does not reach the base of the pronotum. Two short and smooth protuberances are located on either side of the middle of the base. Six macula of decumbent yellow-gold setae are seen around the disc. A discontinuous band of lighter coloured dense setae follows the base of the pronotum. Sides are dark red-brown to black, very coarsely and deeply punctured, covered with scattered pilosity denser than that of the disc. Scutellum strongly declivitous forward, with a rounded tip, covered with short yellow pubescence. Elytra shiny, convex, regularly and slightly narrowed to the apex. A low depression straddles the elytra behind the scutellum. The elytral suture ends apically with an acute angle externally connected to a small tooth by following a concave curvature. Surface of the basal half of the elytra deeply punctured. Punctures of apical half gradually attenuated towards the apex where they completely disappear, giving way to a bumpy surface. Pilosity of the elytra short, decumbent, very sparse near the base, then denser towards the apex. Colour of the humeral quarter red-brown and black, lighter on the disc. The black colour suggests a forward pointing chevron. Apical quarter yellow-brown to brown finishing towards the front in a black tip (sometimes reduced to a black point). Central part of the elytra is yellow with a brown spot in the form of a forward pointing chevron to









the rear of the middle of each elytron. The chevron shaped spots do not extend as far as the suture but reach the lateral edge of the elytra. Legs with femora clavate, laterally flattened, longer than the tibiae. Metafemora reach 6/7th of the length of the elytra. Tibiae very straight. Pilosity of the femora composed of sparse decumbent setae, while that of the tibiae is composed of bristly setae. Underside with a strongly elevated cone-shaped prosternum. This is deeply and densely punctured with a decumbent seta in the middle of each punctation. Prosternum shiny, red-brown, sometimes black on the periphery. Anterior coxae serried (0.2 mm) and protruding. Mesosternum rugose-punctate, covered with very slender, decumbent sparse pilosity. Mesosternal process emarginated between flat coxae. Metepimeron densely covered with easily visible yellow pilosity. Same pilosity covers the mesepimeron more or less completely. Sternite VII slightly emarginate in the middle.
Sexual dimorphism: Female unknown.
Differential diagnosis: This species is noteworthy due to its small size, the antennae not exceeding the apex of the elytra and upper side of the lobes without bristles.

***Aprosictus fuscus* sp. nov.** (Plate 49 fig. 6)
Holotype ♂ AWC: Indonesia, West Papua, 50 km South of Nabire, Flaga road, Pusppenssat, 3°29'53''S/135°43'83''E, 18.II.1998, leg. A.Weigel.
Paratypes: 1♂ LBC: Papua-New-Guinea, Ivimka Research Station, Lakekamu Basin, alt. 120 m, 7°44'S/146°30'E, 03-15.VI.1999, Heydon S. L., Schiff N. & Sears T. A. leg.; 1♂ DTC: Indonesia E, W New Guinea, Doberai Peninsula, Ayamaru vill., near the jetty, 1°16'19S, 132°11'58"E, ~250-260 m, 03-04.IX.2015, lakeside, white light, leg. D.Telnov; 1♂ ANIC: Papua New Guinea, Western Province, South Fly District, Morehead, 08°43'S/141°38'E, 28.IV.1971, at light, Balderson & Baker coll.

Derivatio nominis: Named from Latin "fuscus" (brown) for the uniform colour of this species.
Description: Male. Length 23-27 mm. Humeral width 5.5-6.9 mm. Body elongate, brown or dark brown, often black at the head, the pronotum, the scapes and the femoro-tibial joints. Head short. Eyes big, coarsely faceted, covering the major part of the head, partially bordered with a fringe of yellow golden setae. This fringe is interrupted at the rear of the postero-upper half-lobes which are linked without glabrous separation. Antennal tubercles contiguous, intermediate furrow apparent, pilosity yellow on base. Jowls non-existent. Gula and vertex coarsely wrinkled-punctured. Antennae thin, exceeding the apex of the elytra. Scape globose. Antennomeres 3 to 10 have long cylindrical lobes in postero-external position. The lobes do not extend beyond the antennae. 11th antennomere slightly inwards curved, as long as antennomeres 3 to 8 combined. Relative dimensions of antennal segments are: 1.24-0.26-1.00-0.81-0.85-0.85-0.91-0.98-1.11-1.14-5.13. Antennae covered with short sparse regular and decumbent pilosity. Lobes covered with thin bristly setae. Pronotum subcylindrical, somewhat narrower at apex, slightly longer than broad in the smallest specimens, slightly transverse in the largest. Pronotum densely covered with very short decumbent yellow pilosity, which is less abundant on a wide top stripe thus revealing a relief in the form of transverse wrinkles along its entire length. Two tenuous protuberances can be occasionally distinguished, arranged either side of the middle of the base. Scutellum triangular with rounded top, densely covered with yellow golden pilosity. Elytra three times longer than wide, narrowed from the humeri to the apex. Abundant punctation at the base progressively attenuated towards the apex, which has a slightly irregular surface. Pilosity scattered and regularly distributed over the whole surface of the elytra. All decumbent setae, initially yellow on the humeral quarter, become white for the rest of the elytra. All setae appear in the centre of a punctation. The apex of the elytra has a tiny tooth at the suture. A darker trace is sometimes perceptible at the centre of the elytra. Legs short. Femora brown, laterally compressed, clavate, black at the apical extremity and frequently on top of the external and internal faces. Femora densely covered with white decumbent pilosity. Tibiae shorter than femora with sparse white decumbent pilosity on the upper face, short yellow and bristly on the lower face. Ventral surface irregularly covered with variable pilosity. Prosternum and mesosternum coarsely punctured and covered with thin decumbent short yellow setae. Metasternum densely and shallowly punctured, covered with thin long bristly yellowish setae. Abdomen covered with thin short decumbent white tomentum. Fifth visible sternite straight or slightly concave apically.
Sexual dimorphism: Female unknown.
Differential diagnosis: This species is the only one without black spot on the elytra and without visible spines at their apex.

***Aprosictus glabrofasciatus* sp. nov.** (Plate 49 fig. 7)
Holotype ♂ PJC: Indonesia, Central Sulawesi, Palolo village, 01°17.8'S/120°14.9'E, alt. 1250m, XI.2014,






Christopher Nock leg.
Paratype: 1♂ PJC: same data as the holotype but III.2017.

Derivatio nominis: Named from Latin "glaber" (glabrous) and "fascia" (stripe), referring to the black glabrous fascia of the elytra.
Description: Male. Length 25 mm, humeral wide 7 mm. Body elongate, dark brown to black, apical half of the elytra brown. A black spot is clearly visible at the middle of the elytra. Head rounded. Eyes very large, coarsely faceted, bordered with a fringe of thin short yellow golden setae. Jowls non-existent, entirely covered by the eyes. Gula wrinkled, narrow (width gula / width lower lobe = 0.6). Frons slightly granulous, matt, lightly covered with yellow golden pilosity. Mandibles short, bristling with fine golden yellow setae on their external surfaces. Vertex matt, smooth, glabrous. Neck slightly wrinkled, finely punctured on upper surface, smooth on the underside. The fringe of setae surrounding the eyes extends a long way down the neck behind the upper ocular lobes, leaving the area behind the vertex glabrous. Antennal tubercles protruding, contiguous, terminated in blunt tips, densely covered with golden yellow setae excluding tips, very emarginate with the insertion patella of the scapes clearly visible. Antennae thin, cylindrical, reaching the apex of the elytra. Scape short, globose, slightly downward curving. Second segment of antennae very reduced. Relative dimensions of antennal segments are: 1.22-0.30-1.00-0.85-0.82-0.82-0.82-0.82-0.88-1.07-4.82. Eleventh segment of antennae almost straight and as long as antennomeres 2 to 7 combined. Segments 3 to 10 show long apical filiform feathery lobes. Lobe of the third segment reaches the middle of the 11th antennomere; lobes of the antennomeres 4 to 8 do not reach the extremity of the 11th antennomere. Subsequent lobes exceed the 11th segment. The upper side of the antennae is covered with dense short decumbent thin yellow pilosity. The lower face is densely covered with thin, short and bristly setae identical to those covering the lobes. Pronotum slightly transverse (length/wide = 0.9) with straight anterior margin and very slightly sinuated posterior margin. Sides strongly punctured and covered with dense decumbent yellow golden pilosity. Surface rough on a large median longitudinal stripe which has distinguishable glabrous protuberances either side of the base and median glabrous longitudinal line with poorly defined contour. This line begins at the apex and extends towards the base up for ⅔ of the length of the pronotum. Within this median stripe and outside of the glabrous areas, the yellow golden pilosity is sparse and irregular. Scutellum with rounded top, very densely covered with thin decumbent yellow golden pilosity. Elytra 2.6 times longer than wide, progressively narrowed from the shoulders to the apex. Apex rounded, armed with a very small (almost invisible) tooth at the sutural angle. Basal half of the elytra densely punctured, apical half very lightly punctured. The central smooth and glabrous fascia is in the form of a thick quasi-triangular chevron. Two pseudo-carinae starting in the humeral position are just visible on the elytra with the inner one ending immediately after the fascia, the external one ending just before the apex. Elytral pilosity identical to that of the pronotum but much less abundant and irregularly scattered. Legs short. Femora clavate, covered with dense pilosity of thin decumbent short beige setae. Metafemora reach ¾ of the length of the elytra. Tibiae thin, straight, sparsely covered with short thin setae. Profemora black. Meso- and metafemora dark brown. Underside densely covered with thin yellow tomentum on the sternum, whitish on the abdomen. The posterior margin of the metasternum is smooth and glabrous. Prosternum rugose-punctate with the region behind the coxae heavily declivitous. Mesosternum punctured with a slightly rearward emarginated process bulging on the sides. Fifth visible sternite with a long shallow emargination.
Sexual dimorphism: Female unknown.
Differential diagnosis: this species is very close to *Aprosictus dilatoscapus* sp. nov. but can be distinguished from it by the smooth and glabrous elytral spot (punctured and pilose in *A. dilatoscapus* sp. nov.), by its antennomeres 4 to 9 being approximately of the same length (gradually increasing in *A. dilatoscapus* sp. nov.), by the 11th segment of antennae as long as 2 to 7 combined (longer than 3 to 9 combined in *A. dilatoscapus* sp. nov.) and by its metafemora which reach ¾ of the length of the elytra versus $^{4}/_{5}$ in *A. dilatoscapus* sp. nov.

***Aprosictus intricatus* Blackburn, 1889** (Plate 49 figs 8-10)

Holotype ♂ SAM: 4 labels: white "Aprosictus intricatus Blackb.", white "J.6500 Aprosictus intricatus Bl n. territory" with the red mention "type" on the side, white "N. territory J. P. Tepper", white "SAM Database No. 25-034469".
Additional material: 1♂ ANIC: Australia, Queensland, Burra range Telecom tower, 20°43'48"S/145°10'48"E, 11.II.1994, at light, K. L. Dunn & M. F. Braby coll.






Description: Male. Length 19-25.4 mm. Humeral width 5-6.1 mm. Body elongate, shiny, dark red-brown. Head, pronotum and internal sides of the femora blackish. Anterior half of the elytra marbled with blackish, dark red-brown and brown colours; apical half mostly yellow brown with a thin brown stripe. Head as wide as the pronotum. Eyes coarsely faceted, extended over the cheeks, bordered with a fringe of white setae except for their posterior edge. This pilosity partially covers the antennal tubercles and the mouthparts. Neck densely and finely punctured on top and sides, wrinkled on the underside. Frons punctured with a white seta in the centre of each punctation. Gula punctured on the periphery, smooth in the centre, very slightly narrower than the adjacent ocular lobe. Antennal tubercles protruding, strongly emarginate, without acute elevation backwards. Antennae do not extend completely to the apex of the elytra. Scape gradually widening into club shape. Pedicel very short. Relative dimensions of antennal segments are: 1.89-0.32-1.00-0.74-0.74-0.77-0.81-0.81-1.13-1.52-5.17. Eleventh segment of antennae longer than antennomeres 3 to 8 combined. Segments 3 to 10 have long filiform postero-external lobes which exceed the apex of the antennae except for the lobe of the third antennomere. Antennae, including the lobes, are lightly covered with a short white pilosity. Lower surfaces of antennae and lobes are covered with erect bristles. Antennomeres 1 to 10 are black at their apex. Antennomere 11 is slightly thickened and offset at its extremity. Pronotum subcylindrical, longer than wide. Sides gently and uniformly rounded, being widest in the middle. Anterior margin with a strong constriction, posterior margin very slightly emarginate. Surface shiny, irregularly wrinkled-pleated with three slight protuberances: one in the middle of the disc is wide and rounded, the other two are on each side of the middle of the base. Pilosity white, short, decumbent, sparse on the top and denser on the sides. Scutellum triangular, covered with feebly yellowish-white pilosity. Elytra shiny, covered by very deep punctures on almost the entire surface; this punctation is slightly attenuated at the extremity. Apex with concave arc shaped notch, with a strong spine on each side of this notch. The centre of each punctation has a short white decumbent seta. Two pseudo-carina appear to emanate from alignment of the spaces between punctations along the elytra. The humeral third of elytra is mostly dark red-brown and black, becoming a less intense dark brown for the next third and yellow-brown for the final one third with denser pilosity. A red-brown and black forwards pointing chevron-like macula covers the width of the middle of each elytron. A second red-brown macula of faintly defined contour starts just rear of the centre of the chevron and joins rectilinearly the elytral suture a little before the apex. A second forwards pointing black chevron delimits the end of the dark humeral area. Legs short, red-brown. Femora flattened, clavate, black on the summit, more or less darkened on the internal face, lightly covered with thin decumbent white pilosity. This pilosity is more scattered and more bristly on the tibiae. Metatibiae extend less than 9/10th of the elytra. Lower surface covered with a whitish variable pubescence: thick short decumbent setae on the prosternum and the abdomen, thin short setae on the mesosternum and metasternum. Fifth visible sternite somewhat emarginated.

Sexual dimorphism: Female unknown.

Differential diagnosis: This species is easily recognisable due to the very deeply punctured elytra and pronotum covered with white pilosity. *A. intricatus* Blackburn, 1889 is somewhat analogous to *A. exiguus* sp. nov., particularly the wide extremity of the eleventh antennomeres and the absence of firm bristles over the antennae.

***Aprosictus lombokensis* sp. nov.** (Plate 49 fig. 11)

Holotype ♂ PJC: Indonesia, North of Lombok Island, Senarm village, 5-8.XI.2010, A. Sokolov leg.

Paratype 1♂ PJC: Indonesia, North of Lombok Island, near Sernam village, 4-8.XI.2010, A. Sokolov leg.

Derivatio nominis: Toponymic. To be referring to the place of its capture: the island of Lombok in the province of West Nusa Tenggara.

Description: Male. Length 27 mm, humeral width 7 mm. Body elongate, totally brown with the head and the pronotum darker. Head short, rounded. Eyes large, globular, coarsely faceted. Gula narrow and punctured. Vertex very narrow between postero-upper half-lobes. Frons smooth and glabrous in the centre. Clypeus punctured. Eyes completely bordered with a fringe of short dense thick yellow setae less densely so along the antennal tubercles, the neck, the clypeus and the external edge of the mandibles. Sparse yellow bristles are present on the mouthparts, the gula and the neck. Antennae cylindrical of eleven antennomeres substantially exceeding the apex of the elytra. Scape short, globose, slightly dorso-ventrally arched. Second segment of antennae very reduced. Relative dimensions of antennal segments are: 2.26-0.35-1.00-0.93-0.93-1.25-1.39-1.51-1.62-1.92-11.84.






Eleventh segment of antennae longer than 2 to 10 combined. Antennomeres 3 to 10 have very long, thin cylindrical feather-duster shaped apical lobes. Lobes of the antennomeres 3 and 4 do not attain the apex of the antennae, those of antennomeres 5 to 10 exceed it. Segments 1 and 2 totally covered with a thin short decumbent yellow pubescence; subsequent antennomeres are identically covered with a whitish pubescence. Lobes covered with thin short yellowish white pilosity on the basal fifth of their length. Underside of antennae and whole surface of lobes present thin bristly setae. Underside of the antennae densely punctured. Pronotum slightly transverse, sides narrowed forwards. Front margin straight, posterior margin sinuated. Pronotum covered by very dense short decumbent white pubescence totally masking the ground colour, except for a wide longitudinal central band on the disc with sparse yellow pubescence on lightly punctured surface. A small longitudinal glabrous stripe with an irregular outline follows the median line of the pronotum. Pubescence bordering the central part of the base of the pronotum is predominantly white. Scutellum triangular with rounded tip, covered with a yellow and white backward leaning pubescence similar to that of the sides of the pronotum. Pubescence mostly white on the sides and mostly yellow on the base and in the centre of the scutellum. Elytra elongated, gradually narrowed towards the rear. Elytral suture divergent at the apex, black, provided with a spine. Basal half of elytra densely punctured. This punctation decreases gradually towards the rear. Surface of elytra regularly and lightly covered with short, yellow, backward directed pubescence, except for three glabrous longitudinal pseudo-carina on the elytra. A small black oblique line in the centre of the elytra can be discerned under the pilosity. Legs short, dark brown with femoro-tibial articulation black. Legs covered with a thin sparse decumbent yellow pilosity. Femora clavate. Metafemora very distant from the apex of the elytra. Lower surface covered with a thin short yellow pilosity on the mesosternum and the back of the prosternum, beige on the abdomen, white on the front of the prosternum. Fore coxae protruding and contiguous (0.1 mm between coxae). Mesosternum strongly declivitous. The triangular tip at the metasternal apex lodged in the mesosternum indentation has a small central elevation. Sternite VII distinctly emarginate.

Sexual dimorphism: Female unknown.

Differential diagnosis: *Aprosictus lombokensis* sp. nov. appears similar to *A. armellae* sp. nov. as both have very visible elytral pilosity. What distinguish *A. lombokensis* sp. nov. is elytra progressively narrowed backwards (sub-parallel in *A. armellae* sp. nov.), sides of pronotum with dense pilosity (scattered pilosity in *armellae*), eleventh segment of antennae longer than 2 to 10 combined (equal to 2-10 combined in *A. armellae* sp. nov.), very narrow prosternal process and sternite VII very clearly emarginated (slightly emarginate in *A. armellae* sp. nov.).

***Aprosictus paloloensis* sp. nov.** (Plate 50 fig. 1)

Holotype ♂ PJC: Indonesia, Central Sulawesi, Palolo village, 01°17.8'S/120°14.9'E, alt. 1250 m, XI.2014, Christopher Nock leg.

Derivatio nominis: Toponymic. New name is to refer to the place of its capture, Palolo village.

Description: Male. Length 25 mm, humeral width 6.7 mm. Body elongate. Head, scape, pronotum and a part of the legs are black. Basal half of the elytra, antennae (apart the lobes), ventral face and the rest of the legs are blackish-brown. Apical half of the elytra and lobes of the antennae are dark brown. Head rounded. Eyes very big, coarsely faceted, bordered with a fringe of thin short yellow gold setae. Jowls non visible, totally covered with the eyes. Gula wrinkled, narrow (gula width / width of the lower adjacent ocular lobe = 0.4). Frons: superior half punctured and pilose. Mandibles short, bristly with thin yellow gold setae on the external edge. Vertex matt, smooth, glabrous. Neck finely punctured on the top, smooth on the bottom and lightly wrinkled on the sides. The fringe of setae surrounding the eyes extends slightly down the neck behind the upper ocular lobes, leaving the area behind the vertex glabrous. Antennal tubercles protruding, contiguous, ending with a blunt tip, densely covered with yellow gold setae except for the glabrous tips, strongly emarginate, clearly showing the insertion patella of the scapes. Antennae fine, cylindrical, reaching apex of elytra. Scape short, globose, slightly dorso-ventrally bent. Antennomere 2 very short. Antennomere 3 longer than each of the six following antennomeres. Relative dimensions of antennal segments are: 1.32-0.32-1.00-0.93-0.85-0.85-0.93-0.93-0.96-1.12-5.44. Antennomere 11 almost straight and longer than antennomeres 2 to 7 combined. Segments 3 to 10 carry long filiform feathery lobes on the apex in external position. Lobe of antennomere 3 reaches the middle of the 11th antennomere. Lobes of antennomeres 4 to 8 end prior to extremity of the 11th segment. The two subsequent lobes extend beyond the 11th segment






of antennae. Upper side of antennae covered with dense short decumbent beige pilosity. Underneath densely covered with thin short bristly setae, identical to those covering the lobes. Pronotum slightly transverse (length/width = 0.87) with a straight anterior margin and a very lightly sinuated posterior margin. Sides strongly punctured, covered with dense decumbent beige pilosity. Surface rough on a large longitudinal median stripe, glabrous on two protuberances on either side of the middle of the base and on a median line with poorly defined outline. This line starts at the apex and extends backwards ⅔ of the length of the pronotum. Pilosity into the large median stripe and besides the glabrous areas is beige and relatively dense. Scutellum with a rounded tip very densely covered with thin decumbent yellow pilosity. Elytra 2.6 times as long as wide, progressively narrowed from the shoulders to the apical extremity. Apex rounded, black bordered, terminated by a very small black sutural tooth with a light coloured tip. Basal half of the elytra blackish brown, densely punctured. Apical half dark brown, very lightly punctured. Each elytron with a chevron shaped (with the tip directed forward) smooth and glabrous central spot. Two pseudo-carina starting in humeral position are faintly visible on the elytra: the innermost one ends just after the fascia, the outer one ends just short of the apex. Pilosity irregularly distributed on the elytra with identical setae to those of the pronotum but more sparse. Legs short. Femora clavate, covered with dense pilosity of short thin decumbent beige setae. Profemora black. Meso and metafemora dark brown. Metafemora reaches $^{7}/_{10}{}^{th}$ of the length of the elytra. Tibiae thin, straight, shorter than the femora, lightly covered with short thin setae. Ventral surface densely covered with a thin tomentum beige on the prosternum, yellowish on the mesosternum and whitish on the abdomen. Prosternum very rough with the part behind the coxae strongly declivitous. Mesosternum punctured with a significantly rearward emarginated process with bulging sides. Fifth visible sternite straight without notch.

Sexual dimorphism: Female unknown.

Differential diagnosis: This species is very close to *Aprosictus glabrofasciatus* sp. nov. but mainly distinguished from it by the beige pilosity of the pronotum, the smooth and shiny front of the frons, the narrow gula, the black maculae of the elytra in the shape of a thin chevron, the strongly notched mesothoracic process and the last sternite without emargination.

***Aprosictus pedicellus* sp. nov.** (Plate 50 fig. 2)

Holotype ♂ PJC: Indonesia, West Sumatra, Padang, V.1999, Shunchang Luo leg.

Derivatio nominis: Named from Latin "pedicellus" (pedicel) in reference to the particularly shaped pedicel of this species.

Description: Male. Length 21.5 mm, humeral width 5.6 mm. Body elongate, reddish-brown. Pronotum blackish. Head, elytral macula, scapes, internal side of meta and mesofemora and external side of profemora black. Head as wide as pronotum. Eyes huge, coarsely faceted, encompassing the majority of the head including jowls. Frons and gula with some coarse punctations with central single yellow-gold seta. Gula half as wide as the adjacent ocular lobe. Vertex smooth and glabrous near the eyes. Neck densely covered with shallow punctures. Antennal tubercles contiguous, very emarginate and slightly protruding. Eyes, excluding behind the lower ocular lobes, surrounded by a thin strip of yellow-gold recumbent setae. Antennal tubercles sparsely covered with thinner gold setae. Antennae of eleven cylindrical segments, not reaching apex of elytra. Scape short, globular, strongly club-shaped, dilated at the apex, covered with a few thin yellow-gold recumbent setae. Pedicel non-rectilinear, extremely short, with a peduncle (embedded part into the scape) forming a marked angle (135° at the external side) with the outer part of the segment. Relative dimensions of the antennomeres are: 1.67-0.37-1.00-0.93-0.93-0.90-1.00-0.97-1.10-1.23-7.55. Antennomere 11 is substantially of the same length than antennomeres 3 to 10 combined. Antennomeres 3 to 10 have elongated feathery lobes in postero-external position. Flabellum 3 reaches $^{7}/_{10}{}^{th}$ of the length of 11th segment, flabellum 4 reaches the $^{9}/_{10}{}^{th}$ of the length of the 11th segment, flabellum 5 reaches the apex of the 11th segment. The subsequent flabellae arrive more or less at the same level and exceed the apex of the elytra. Antennae with whitish recumbent pilosity on the internal and upper sides, of progressively decreasing length from antennomere 2 to antennomere 11. This pilosity is denser than that of the scape. The entire surface of the flabellae and the lower antennal surface are densely and regularly covered with fine erect bristles. Pronotum shiny, as wide as long. Anterior margin straight, posterior margin slightly sinuated. Pronotum covered with a dense recumbent yellow-gold pilosity concealing the surface, except for a wide median slightly pilose stripe. This stripe has a lightly wrinkled-punctured relief with three small smooth glabrous areas: two






protuberances on either side and against the base of the pronotum and a triangular axial area against the front margin. Scutellum with straight edges and round top, covered with dense short yellow-gold rearward facing recumbent pilosity. Elytra distinctly convex with a ratio of length to humeral width (at the widest) equal to 2.4. Elytra progressively narrowed from front towards the rear. Apex terminated with a tiny (hidden by pilosity) sutural spine. A black comma shaped macula is in the centre of each elytron. The maculae are distant from the suture but reach the external edge, which is black from the macula to the apex. Punctation firstly dense and deep on the anterior half, considerably decreasing behind the central macula. The centre of each puncture has a thin gold, rearward facing, recumbent seta. Pilosity of elytra sparse, regularly distributed over the entire surface. Legs flattened. Femora clavate, covered with thin whitish recumbent pilosity. Tibiae straight, covered with scattered and bristly setae. Ventral surface covered with a thin yellowish-white tomentum. Prosternum strongly elevated and punctured. Fore coxae prominent with very narrow process (0.23 mm between coxae). Mesothoracic process forked back. Fifth visible sternite simply sinuated.

Sexual dimorphism: Female unknown.

Differential diagnosis: Only this species possesses a non rectilinear pedicel which easily differentiates it from the other species.

***Aprosictus sangirensis* sp. nov.** (Plate 50 figs 3-4)

Holotype ♂ PJC: Indonesia, North Sulawesi province, Sangihe archipelago, Sangir island, XII.2015, Masahiko Yoshikawa leg., local coll.

Paratype 1♀ MNHN: Indonesia, 2 labels: “Iles Sangir” and “Ex-Musæo VAN LANSBERGE” in coll. James Thomson.

Derivatio nominis: Toponymic. New name to refer to the place of capture, Sangir island in North Sulawesi province.

Description: Male. Length 28.5 mm, humeral width 6.5 mm. Body reddish-brown with the pronotum dark brown. Scape, apex of the femora, extremity of the elytra and elytral spot black. Head short, round, as wide as the pronotum. Eyes very big, globose, coarsely faceted, totally hiding the jowls. Eyes encircled with a fine fringe of short yellow setae which also cover the antennal tubercles and the entirety of the surface between the tubercles and the eyes. Vertex wrinkled-punctured, covered with few sparse decumbent short yellow setae. Antennal tubercles contiguous, strongly notched, raised, terminated in a rounded tip. Frons punctured. Gula coarsely punctured, covered here and there with a few scattered bristles. Gula one-third of the width of the adjacent ocular lobe. Antennae cylindrical, extending well beyond the elytra. Scape globose for its entire length. Relative dimensions of antennal segments are: 2.37-0.37-1.00-1.05-1.16-1.21-1.47-1.53-1.90-2.21-12.41. 11th segment of antennae extremely long, exceeding the length of the antennomeres 2 to 10 combined. Segments 3 to 10 have elongated lobes in postero-external position. Lobes of antennomeres 3 and 4 do not reach the extremity of the elytra, those of the following antennomeres do. Antennae uniformly covered with thin short decumbent whitish setae. Underside of the antennae and flabellae are covered with thin bristly setae regularly arranged. Pronotum as long as wide. Anterior margin slightly sinuated, posterior margin long-emarginated in the middle. Sides nearly straight from the base to the ¾ of its length, then quickly narrowed forward. Ratio basal width to apical width = 1.4. Disc shiny, wrinkled-punctured, with a fine central glabrous longitudinal line ending before the base of the pronotum; next to this line, the yellow pilosity is reduced, short, thin and regular, allowing the basal colour to show through. Two small glabrous protuberances extend from the base on each side of the centre. Sides matt, wrinkled-punctured, with the same pilosity as the disc. Scutellum triangular, declivitous, covered with short decumbent gold pubescence. Elytra elongated, progressively narrowed backwards. Ratio humeral width to width before the apical curvature = 1.5. The apical sutural margins of the elytra are divergent and rejoin the external margin in a wide spine. Apex of elytra black, raised up, slightly concave. A small black macula, comma shaped, is present in the middle of each elytron. Basal third is dark brown, apical two-thirds are brown. Punctation dense and deep at the base and gradually attenuated towards the apex. Two pseudo-carina are visible along the elytra. Pilosity on the whole surface of the elytra is regular, sparse and white. All setae are located in the centre of a punctation. Legs short. Femora clavate, flattened, longer than the straight tibiae. Metatibiae do not reach the apex of the elytra. Profemora are deep black. Ventral surface dark brown at the level of the thorax, abdomen brown. Prosternum coarsely punctured and elevated between contiguous and protruding coxae. Mesosternum densely and deeply punctured, with a deep V-shaped indentation at the rear. Metasternum with a distinct groove on the median suture. Last sternite narrow without visible





emargination.

Sexual dimorphism: Female same colour as the male, but of different size and shape. Length 35 mm, humeral width 9.4 mm. Body elongate with parallel elytra presenting a well-defined humeral widening for one fifth of their length. Head narrower than the pronotum. Vertex and frons possess a small glabrous area. Gula 1.4 times narrower than the adjacent ocular lobe. Antennae exceed the middle of the elytra, antennomeres 4 to 11 dorso-ventrally flattened. Relative dimensions of antennal segments are: 1.25-0.19-1.55-1.07-0.97-1.00-1.00-0.99-1.09-1.04-1.75. Antennomeres brown, slightly darker at the apex. Segments 3 to 10 are externally toothed at the apex. Pronotum slightly transverse with the sides rounded and the widest section behind the middle. Pronotum with a small anterior constriction, base wider than apex. Scutellum U-shaped. Elytra convex with a black external apical edge and rounded apex without spine. A black macula wider than that of the male is visible behind the middle of the elytra. Front legs not darkened like those of the male. Mesosternum shows a vaguely rectangular apical emargination. Last sternite practically straight.

Differential diagnosis: Very close to *Aprosictus dilatoscapus* sp. nov. but can be distinguished in male by a narrow gula, 11th segment of antennae longer than 2 to 10 combined, a raised elytral apex and an anterior tip of the metasternum passing under the posterior indentation of the mesosternum, whereas the tip is imbricated into the indentation in *A. dilatoscapus* sp. nov.

***Aprosictus sexpunctatus* sp. nov.** (Plate 50 figs 5-6)

Holotype ♂ ANIC: Australia, Queensland, Toowoomba, 27°33'36"S/151°57'0"E, 30.XII.1972, D.A. Lane coll.

Paratypes 6 specimens: 1♀ (allotype) ANIC: Australia, New South Wales, 1,5 miles east of Freshwater River, Iluka district, 29°21'36"S/153°19'48"E, 17.I.1971, mercury vapor light, D. K. McAlpine & A. Hughes coll.; 1 ♂ ANIC: Australia, Queensland, Mt. Spec, 18°57'S/146°11'E, 13.I.1964, J. G. Brooks coll.; 1 ♂ ANIC: Australia, Queensland, Toowoomba, Prince Henry Heights, 27°33'S/151°59'E, alt. 620 m, 10.I.1983, I. F. B. Common coll.; 1 ♂ ANIC: Australia, New South Wales, north of Grafton, Fortis Creek State Forest, 29°29'S/152°55'E, 09.XII.1996, S. G. Watkins coll.; 1 ♂ ANIC: same data as holotype; 1 ♂ ANIC: same data as allotype.

Derivatio nominis: from Latin "*sex*" (six) and "*puncta*" (point), in relation to the pattern of the pronotal pilosity.

Description: Male. Length 19-22 mm, humeral width 5-5.8 mm. Head, pronotum and thorax red-brown to blackish. Legs, antennae and abdomen brown to dark brown. Elytra marbled yellow to black with brown, dark brown and red-brown colours. Head short, narrower than the pronotum. Eyes globular, coarsely faceted, completely covering the head except for the frons, the vertex and the gula. Gula deeply and densely punctured, relatively narrow (1.5 times narrower than the width of the adjacent ocular lobe). Frons coarsely punctured in its narrower part and smooth in its larger part. Vertex punctured. Antennal tubercles protruding, finely punctured, strongly emarginate, smooth on the summit ridge, close slopped separated by a thin groove. Eyes surrounded by short dense gold pilosity, excluding the posterior margin, this pilosity extends along the antennal tubercles but stops short of the summit ridge. Antennae of eleven cylindrical segments. Relative dimensions of antennomeres are: 1.64-0.21-1.00-0.86-0.93-0.93-0.93-0.96-1.14-1.79-5.43. Eleventh segment of antennae as long as antennomeres 3 to 8 combined. It possesses a small notch visible near its extremity. Scape strongly clavate, extended to the anterior margin of the pronotum. Segments 3 to 10 show a long flabellum in postero-external position. The flabellum of segment 3 extends as far as the top of the segment 10, the other lobes reach a point between the extremity of the antennomeres 10 and 11. Scape sparsely and lightly punctured with tiny setae in the middle of each punctation, some long erect bristles are visible on the scape. Antennae covered with thin antenna coloured setae and erect dense bristles uniformly distributed only on the lower face (including the lobes). Antennae extend to or exceed the apex of the elytra. Pronotum slightly longer than wide. Sides curved, widest beyond the middle. Anterior margin straight with a slight constriction. Posterior margin lightly sinuated. Disc wrinkled-punctured. Sides very coarsely punctured and darker than the disc. Pronotum sparsely covered with very thin short gold setae and long white scattered bristles found mainly on the sides. Six tuft of gold setae vaguely arranged in circle around the disc characterize this species. Scutellum with rounded top, covered with short decumbent gold setae. Elytra shiny, convex, elongated (length/humeral width = 2.5 to 2.6), gradually narrowing from humeri to apex. A slight depression straddling the elytral suture is visible behind the scutellum. The deep and dense punctation gradually decreases from front to back. Each puncture houses a short thin seta. Pilosity









denser on the apical quarter of the elytra but may be very attenuated in some specimens. Pattern visible on elytra is a black forward facing chevron rear of the middle of each elytron, a red-brown to black humeral quarter lighter in tone on the disc and depression, an oblique brownish mark in the apical quarter starting from the centre of each elytron and extending rearwards onto the suture. The colouration is darker in the region of denser pilosity. Apex of elytra rectilinear or slightly concave with a strong spine on each side. The internal one being a continuation of the elytral suture. Legs with femora longer than tibiae. Femora flattened, clavate, with the inner face darkened. Tibiae straight. Metafemora do not extend as far as the apex of the elytra. Pilosity long, fine, sparse, decumbent, white on the femora; white and erect on the top of the tibiae; dense and yellow below. Ventral face shiny, dark brown. Prosternum slightly raised between the coxae, punctured and sparsely covered with thin short setae. Procoxae prominent with very narrow process. Mesosternum declivitous, punctured, strongly emarginate at the apex process. Metasternum finely punctured and sparsely covered with a thin white tomentum. Abdomen covered with thin white setae, more numerous on the sides than in the centre. Last visible sternite almost straight with a short slight emargination in the middle.

Sexual dimorphism: Female body length 21.5 mm, humeral width 5.4 mm. Same colour as the male. Antennae reach the apex of the elytra without lateral lobes. Relative dimensions of antennomeres are: 0.93-0.13-1.00-0.82-0.92-0.89-0.85-0.86-0.97-1.06-1.39. Segments 3 to 10 toothed externally at the apex. Pronotum as long as wide with sides regularly rounded and widest in the middle. Elytra parallel, elongated, with the ratio of length to humeral width 2.7. Last visible sternite regularly rounded without emargination.

Differential diagnosis: *A. sexpunctatus* sp. nov. is close to *A. intricatus* Blackburn, 1889. They both have a similar elytral pattern and two clearly visible spines at their apex. However, *A. sexpunctatus* sp. nov. has a pronotum with a very reduced gold pilosity except for six typical setae tufts, whereas *A. intricatus* Blackburn has a well-defined white pilosity. The flabellae of *A. sexpunctatus* sp. nov. extend to different points on the antennae, whereas those of *A. intricatus* extend to the same point except for the flabellum of antennomere 3.

Note: Ślipiński & Escalona (2016) confuse this new species (page 351, fig. 42A) and *A. intricatus* (page 534, fig. 224H), clearly because the obvious shared characteristics, such as the shape of the antennae, can overshadow other more discreet anatomical details. The description of *A. intricatus* by Blackburn (1889), which discusses the pilosity of the pronotum, leaves no room for doubt as to which species was intended, but the fact that to date only a single species had been described from Australia left considerable scope for error.

***Aprosictus ternatensis* sp. nov.** (Plate 50 fig. 7)

Holotype ♂ MNHN: Indonesia, North Maluku, with 2 labels: "Molucc. Ternate" and "Ex-Musæo VAN LANSBERGE" in coll. James Thomson.

Derivatio nominis: Toponymic. Named in relation to the place of its capture, Ternate Island in North Maluku Province.

Description: Male. Length = 28.7 mm, humeral width = 7.4 mm. Body elongate. Head, scapes, pronotum and legs dark brown. Elytra and antennae brown. Head short, round, a little narrower than the pronotum. Eyes coarsely faceted, encompassing the majority of the head. The eyes are surrounded above by a wide stripe of yellow gold setae abruptly changing to fine setae below. This pilosity also covers the majority of the antennal tubercles except for the summit ridge. Vertex only punctured near the neck, otherwise being a practically smooth surface with only two or three setae. Antennal tubercles protruding, contiguous and very emarginate. The bottom of the interantennal groove is not visible beneath the dense pilosity. Frons punctured, totally covered with thin sparse regular yellow pilosity. Gula punctured with a seta in the hollow of each punctation; pilosity here is very sparse. Gula moderately wide (ratio width of the gula to width of the adjacent ocular lobe = 0.56). Antennae fine, extending beyond the apex of the elytra. Scape short, globular over its entire length, often blackened at the apex, very finely punctured and regularly covered with a fine sparse pilosity. Relative dimensions of the antennomeres are: 2.38-0.36-1.00-0.97-1.08-1.11-1.19-1.33-1.55-1.72-15.71. Pedicel small, particular in that it is directly nested in the scape without visible peduncle. Antennae regularly covered with a fine short decumbent pilosity. Antennomeres 3 to 10 have a fine long feathery lobe in postero-external position. Flabellum 3 extends beyond the middle of the segment 11, flabellum 4 extends $^{4}/_{5}^{th}$ of the length of the eleventh segment, the other flabellae extend just beyond the extremity of the antennae. Lower surface of the antennae and flabellae are covered with fine erect regularly arranged bristles. Pronotum slightly transverse. Front margin straight,





posterior margin with a long shallow emargination. Sides of pronotum widest at the middle, slightly concave before the middle, straight and becoming thinner thereafter. Ratio width of base to width of apex before constriction = 1.3. Pronotum shiny, wrinkled on the top; the wrinkles begin in the median axis, go forward slantwise from each side of this axis, giving the appearance of nested chevrons directed towards the rear. Pronotum with three glabrous smooth areas: a thin median line which stops short of the two margins and two small protuberances from each side of the middle of the base. The rest of the pronotum is covered by regular dense decumbent yellow-gold pilosity. Scutellum declivitous with rounded tip, covered with short dense yellow gold pilosity. Elytra progressively narrowed to the apex which ends in a spike or small spine (the only specimen studied has a spike differentiated into a spine on the left elytron whereas the right elytron did not). The lateral margin at the level of the apical curvature is black and slightly raised, forming a concavity at the apex. Ratio width of the base to width before the apical curvature of the elytra is 1.7. A small oblique black line is situated in the middle of each elytron but stops short of the edges. The front of the elytra is densely and regularly punctured, frequency decreases gradually towards the apex. The pilosity is regular, short, recumbent and sparse. Legs with femora blackened at the apex, clavate, laterally flattened. Tibiae straight. Ventral surface densely covered with a yellowish white tomentum which is strongly marked on the metacoxae. Prosternum punctured, raised between the coxae with a strong anterior bulge. Mesosternum punctured and strongly emarginated U-shaped at the rear. Metasternum has an abrupt recess at the level of its emargination. Abdomen with a narrow fifth visible sternite obviously emarginate.

Sexual dimorphism: Female unknown.

Differential diagnosis: *Aprosictus ternatensis* sp. nov. is closely related to *A. sangirensis* sp. nov. and can be distinguished from it by the ratio of the length of the 11th segment of the antennae to the length of antennomeres 7 to 10 combined equal to 2.71 (this ratio is 1.75 for *A. sangirensis* sp. nov.); by the less raised and non-divergent elytral extremity so that the apical spike is in the axis of the suture; by the emarginated fifth visible sternite.

Key to males of *Aprosictus* Pascoe, 1866

1 Size longer than 18 mm 2
– Size less than or equal to 18 mm (Australia) .... *A. exiguus* sp. nov.
2 Each elytron with only one sutural spine, sometimes tiny 3
– Each elytron with two apical spines (Australia) 11
3 Spine clearly visible despite pilosity 4
– Spine not clearly visible under the pilosity 5
4 Scutellum covered with yellow and whitish setae 6
– Scutellum only covered with yellow gold setae 7
5 Middle of each elytron with a black spot 8
– Middle of each elytron without black spot (New-Guinea) ..... *A. fuscus* sp. nov.
6 Ratio: humeral width to apical width before the elytral curvature upper than 1,5 (Lombok) .... *A. lombokensis* sp. nov.
– Ratio: humeral width to apical width before the elytral curvature lower than 1,5 (West Papua) .... *A. armellae* sp. nov.
7 11th antennomere as long as segments 3 to 9 combined (Sumatra) ..... *A. acutipennis* sp. nov.
– 11th antennomere longer than segments 3 to 9 combined 10
8 Pedicel straight (Sulawesi) 9
– Pedicel strongly angulated (Sumatra) .... *A. pedicellus* sp. nov.
9 Pilosity of the pronotum yellow gold; extremity of the mesothoracic process feebly emarginate .... *A. glabrofasciatus* sp. nov.
– Pilosity of the pronotum beige; extremity of the mesothoracic process strongly emarginate .... *A. paloloensis* sp. nov.
10 Antennomere 11 shorter than 2 to 10 combined (Sulawesi) 12
– Antennomere 11 longer than 2 to 10 combined ... 13
11 Pronotum with 6 spots of yellow gold pilosity .... *A. sexpunctatus* sp. nov.
–Pronotum with sparse white regular pilosity .... *A. intricatus*
12 Pronotum with very short, very sparse, gold pilosity . ..... *A. dilatoscapus* sp. nov.
– Pronotum with a short, dense, yellow pilosity .... *A. duivenbodei*
13 Segment 11 longer than twice 7 to 10 combined (Ternate) ..... *A. ternatensis* sp. nov.
– Segment 11 shorter than twice 7 to 10 combined (Sangir) ..... *A. sangirensis* sp. nov.

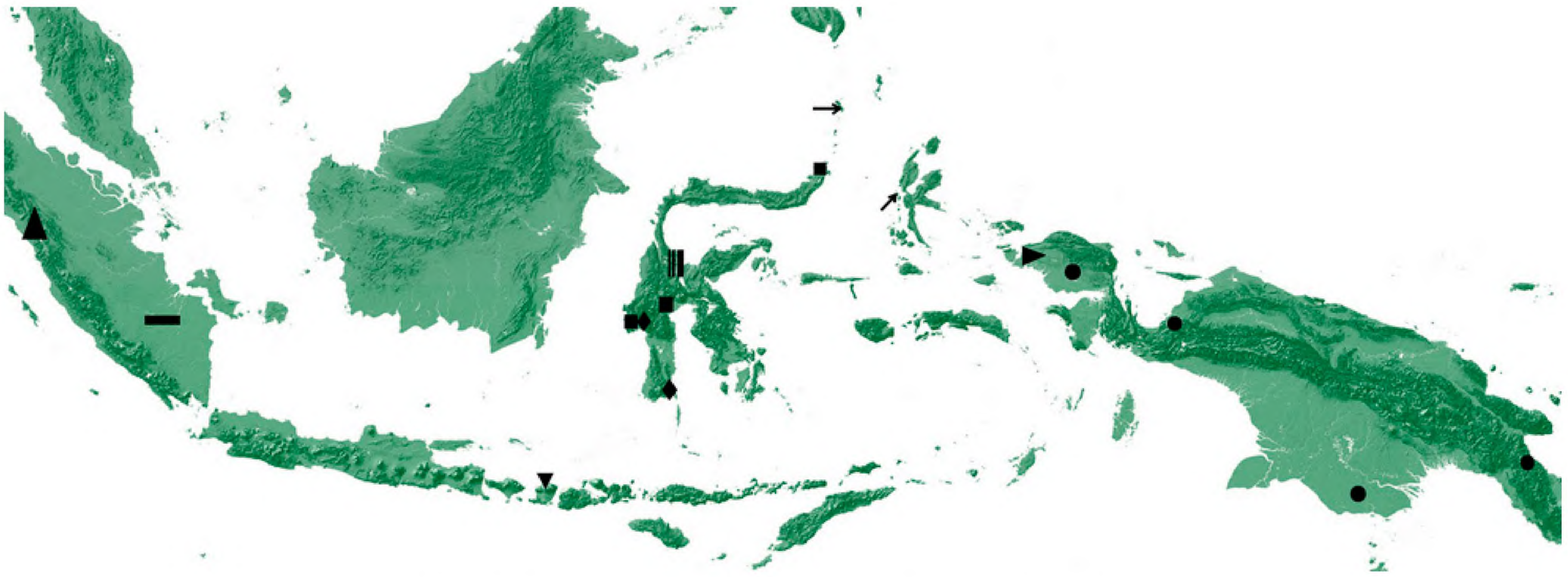
Conclusions

Very few *Aprosictus* have been collected up until now, and many species are described from just one or two specimens discovered in recent years: *A. acutipennis* sp. nov., *A. armellae* sp. nov., *A. glabrofasciatus* sp. nov., *A. lombokensis* sp.

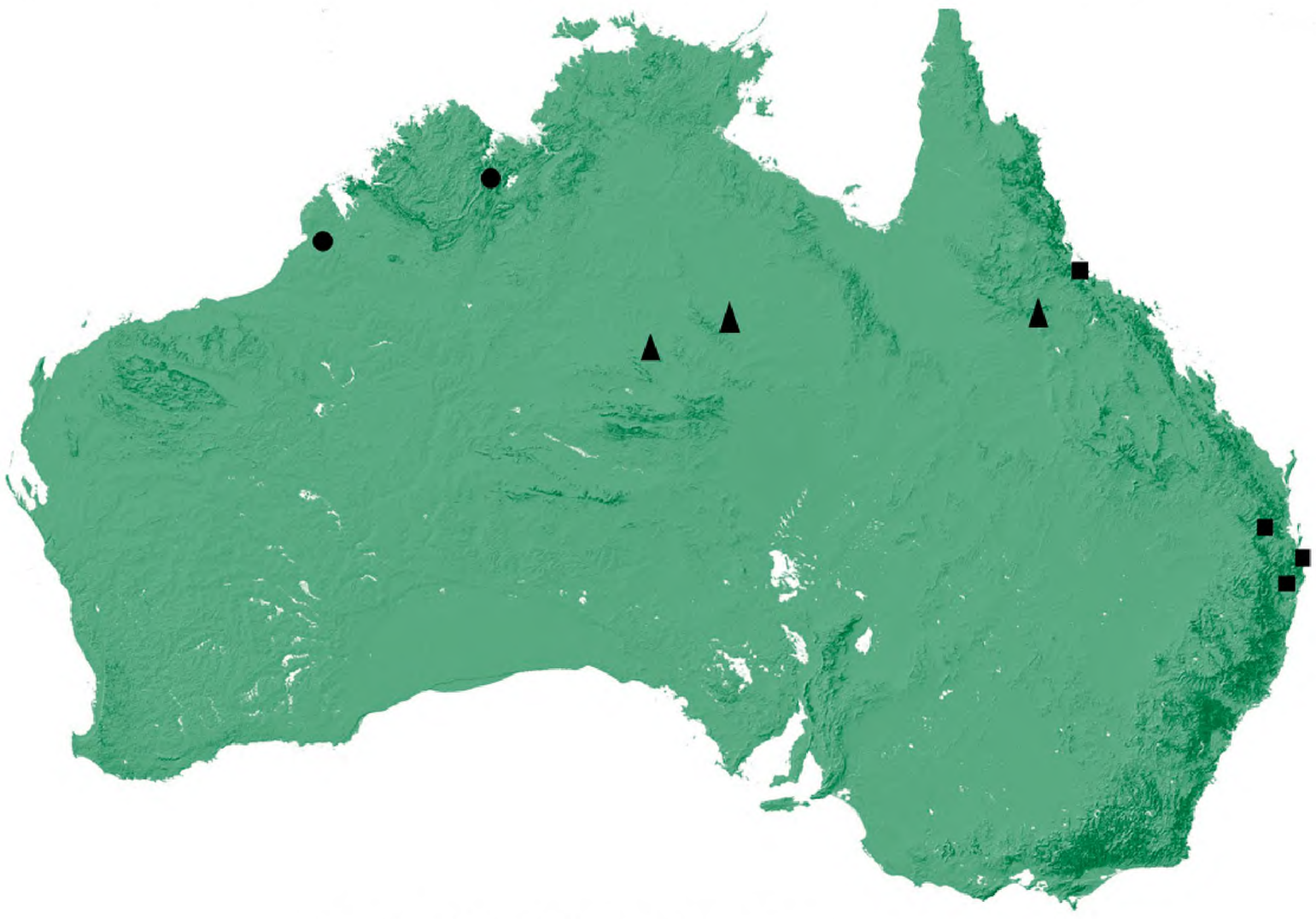





nov., *A. paloloensis* sp. nov., *A. pedicellus* sp. nov., *A. sangirensis* sp. nov. and *A. ternatensis* sp. nov. This situation suggests that the genus *Aprosictus* is a recent group, the real distribution of which is still unknown. It is probable that strong endemism exists, as shown by the presence of distinct species like *A. lombokensis* sp. nov., *A. sangirensis* sp. nov. and *A. ternatensis* sp. nov. on small isolated territories. This also applies to the lesser known genus *Duplipectus* gen. nov. This implies that further discoveries on other Indonesian islands may lead to possible rearrangements within this group of insects. For example, species like *A. armellae* sp. nov. and *A. lombokensis* sp. nov., although very distant geographically, are strongly similar, in this case showing strong pilosity and a slimmer form; *A. sexpunctatus* sp. nov., *A. intricatus* Blackburn and *A. exiguus* sp. nov. seemingly evolved in Australia, since all three possess very deeply punctured and bidentate elytra with fairly comparable blotches and flabellae without erect setae on the top; *A. dilatoscapus*, *A. duivenbodei*, *A. sangirensis*, *A. acutipennis* and *A. ternatensis* are all very close in colouration and shape, with black apex and



Map 2. Distribution of Oriental and Papuan *Aprosictus*.
Legends: horizontal line – *A. acutipennis* sp. nov., right-directed triangle – *A. armellae* sp. nov., rhomboids – *A. dilatoscapus* sp. nov., squares – *A. duivenbodei* (Kaup, 1866), circles – *A. fuscus* sp. nov., vertical line – *A. glabrofasciatus* sp. nov., reversed triangle – *A. lombokensis* sp. nov., two vertical lines – *A. paloloensis* sp. nov., triangle – *A. pedicellus* sp. nov., horizontal arrow – *A. sangirensis* sp. nov., oblique arrow – *A. ternatensis* sp. nov.



Map 3. Distribution of Australian *Aprosictus*.
Legends: circles – *A. exiguus* sp. nov., triangles – *A. intricatus* Blackburn, 1889, squares – *A. sexpunctatus* sp. nov.



toothed elytra; and finally *A. pedicellus* sp. nov., *A. paloloensis* sp. nov., *A. glabrofasciatus* sp. nov. and *A. fuscus* sp. nov. form a last subgroup with elytra lacking visible teeth.

The description of the females, once greater numbers are discovered and available for study would make it possible to recognise affinities between species. Noteworthy differences between females of *A. sangirensis* sp. nov., *A. duivenbodei* (Kaup, 1866) and *Aprosictus* sp. [6] on the one hand and the female of *A. sexpunctatus* sp. nov. on the other hand can be seen. *A. sexpunctatus* sp. nov. differs from other females of the genus by much longer antennae that reach the extremity of the elytra and by an elytral apex provided with two spines as in the male.

Isolation and independent evolution of Australian species will certainly be clarified in the coming years, possibly including their separation into a distinct subgenus to take account of their particular anatomical features.

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6 Unlabelled female seen in the Thomson's collection (MNHN) measuring 35 mm long and 9 mm wide and which could not be related to any described species. It is probably new but its origin is unknown (Plate 50 fig. 8).

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A new subgenus and three new species of *Endelus* Deyrolle, 1864 (Coleoptera: Buprestidae) from Indonesia and the Philippines, with a review of the *Endelus bakeri* Kerremans, 1914 species group

MARK YU. KALASHIAN

Scientific Centre of Zoology and Hydroecology, National Academy of Sciences of Armenia, P. Sevak Street 7, 0014, Yerevan, Armenia; e-mail: mkalashian1@gmail.com

Abstract: *Endelus* (*Papuadelus* subgen. nov.) *telnovi* sp. nov. from West Papua (Indonesia), *E.* (s. str.) *bellamyi* sp. nov. from Palawan (The Philippines), and *E.* (s. str.) *pseudobelial* sp. nov. from Luzon (The Philippines) are described and illustrated; two latter species belong to *E.* (s. str.) *bakeri* Kerremans, 1914 species-group established in this paper. Lectotype of *Endelus bakeri* Kerremans, 1914 as well as lectotypes of *E. chalybaeotinctus* Obenberger, 1932 and *E. inaequalipennis* Obenberger, 1937 also belonging to *E. bakeri* group are designated. A key to species of *E. bakeri* group including also *E. palawanensis* Fisher, 1921 and *E. belial* Obenberger, 1924 is provided.

Key words: Coleoptera: Buprestidae, Indonesia, West Papua, The Philippines, *Endelus bakeri* Kerremans, 1914 group nov., new subgenus & species.

Introduction

The present work is a part of comprehensive study of the genus *Endelus* Deyrolle, 1864 (Coleoptera: Buprestidae) carried out by the author during recent decades (Kalashian 1995, 1997, 1999a & b, 2007, 2011, 2013). It comprises the descriptions of three new species from Indonesia and the Philippines. Species from Indonesia (West Papua) belong to a new subgenus. Another two species belong to *E.* (s. str.) *bakeri* Kerremans, 1914 species-group, established and reviewed below.

Abbreviations used in the text:

BMNH – The Natural History Museum, London, United Kingdom;
CSCA – California State Collection of Arthropods, Sacramento, U.S.A.;
MKCY – Collection M. Kalashian, Yerevan, Armenia;
NME – Naturkundemuseum Erfurt, Erfurt, Germany;
NMPC – Národní Muzeum v Praze, Prague, Czech Republic;
USNM – National Museum of Natural History, Washington, U.S.A.;
ZIN – Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia.

The labels are cited using the following abbreviations: (h) – handwritten text, (p) – printed text, ### – illegible portions of text. Some additional comments or interpretations are included in square brackets [ ] and the data of individual labels are separated by slash mark (/).

Taxonomic part

Endelus subgenus ***Papuadelus* subgen. nov.**
Type species: *Endelus* (*Papuadelus*) *telnovi* sp. nov., by present designation

Derivatio nominis: The subgeneric name is derived from Papua – name of the island of origin, and "delus" – terminal part of generic name "*Endelus*".
Description: Body moderately elongate, bronzy with reddish-coppery luster, elytral depressions somewhere with bluish-green reflection, surface microreticulated, with silky luster, this sculpture slightly smoothed in elevated portions of pronotum and elytra and ventrally. Head large, slightly widened anteriorly, slightly narrower than anterior margin of pronotum, surface with rough and rather dense punctures. Frontovertex deeply arcuately






concave, oculofrontal margins obtusely rounded, eyes convex, in dorsal aspect rather small, pointed nearly directly forwards. Temples much longer than eyes, angularly projecting behind them. Pronotum widely irregularly flattened along sides and medially of posterior angles, with single transverse elevation near anterior 1/3, medially gibbous and divided by shallow longitudinal depression into pair of small tubercles. Scutellum divided by distinct transverse arch-shaped ledge into slightly convex anterior and flattened posterior portions. Elytra slightly wider than pronotum, with distinct humeral tubercles, behind them surface of elytra abruptly falls to lateral margins forming narrow flattened slopes reaching posteriorly nearly to apical 1/6 of elytra, elytral disc uneven, with rather deep depressions and distinct elevations.

Differential diagnosis: Most characteristic feature of new subgenus is structure of head; in all other *Endelus* species eyes in dorsal aspect pointed mainly to sides, more or less continuing temples which are nearly straight, weekly convex or sinuate; punctuation of head in other *Endelus* is much finer than in new subgenus. Scutellum in other *Endelus* is without ledge, flattened or weekly convex. By deeply concave frontovertex and uneven elytral surface the new subgenus shows some resemblance with subgenus *Kubaniellus* Kalashian, 1997 and species-group *E.* (s. str.) *bakeri* Kerremans, 1914, gr. nov., established and reviewed below but differs by structure of pronotum – in *Kubaniellus* species pronotum medially with pair of large and deep transversely oval, rounded or irregular foveae, in representatives of *E.* (s. str.) *bakeri* group pronotal disc with two distinct transversal elevations.

***Endelus* (*Papuadelus*) *telnovi* sp. nov.** (Plate 51 fig. 1)

Holotype ♂ NME: INDONESIA E, West Papua, Tamarau mts., ~12 km NW Fet vill., 00°46'05"S 132°19'06'E, 1050 m, 12-13.II.2012, primeval lower montane forest, MV light, leg. D.Telnov.

Derivatio nominis: With my gratitude and respect I am glad to dedicate the new species to Dr. Dmitry Telnov (The Entomological Society of Latvia, Rīga), well known researcher of Coleoptera, in particular of entomofauna of Wallacea and New Guinea, and collector of the new species.

Description: Body moderately elongate, 2.53 times as long as wide, bronzy with reddish-copper lustre, depressions of elytra somewhere with irregular greenish-blue spots; ventral surface dark bronzy with reddish reflection better visible laterally. Surface microreticulated, with silky luster, this sculpture slightly smoothed in elevated portions of pronotum and elytra and ventrally. Body length 4.3 mm, width 1.7 mm. Head large, slightly wider than anterior margin of pronotum. Clypeus deflected back, situated nearly horizontally, nearly equilaterally triangular, deeply arcuately emarginated distally. Frons slightly widened posteriorly, frontovertex deeply arcuately depressed, depression posteriorly not reaching anterior margin of pronotum. Frons posteriorly of clypeus keel-shaped, this keel does not reach inner margin of eyes, behind it frons with deep transversal groove and with deep rounded fovea medially. Oculofrontal margins obtuse, rounded, eyes convex, in lateral aspect narrowly reniform, in dorsal aspect rather small, pointed nearly directly to front. Temples mush longer than eyes, angularly projecting behind them, slightly converging posteriorly. Surface of head with distinct punctures, slightly shallower and sparser anteriorly, coarser and denser posteriorly. Antennomeres 1 and 2 big, swollen, 3 small, slightly elongate, very finely enlarged distally, 4 nearly equilateral, slightly enlarged distally, antennomeres 5-11 strongly transversally serrate. Pronotum slightly wider than elytra, 1.95 times as wide as long, widest approximately near posterior 1/3, with sides converging nearly straight forward and sinuately backwards to approximately straight basal angles. Lateral margins very finely irregularly serrate, bordered with thin edging shortly continued along anterior and posterior margins of pronotum. Anterior margin of pronotum moderately bisinuate, posterior margin strongly bisinuate, with wide trapezoid medial lobe. Pronotum widely irregularly depressed along sides and medially of posterior angles, near anterior 1/3 with transversal, medially gibbous elevation, divided by shallow longitudinal depression into pair of small tubercles, behind of elevation pronotum with pair of large, rather deep irregular depressions. Surface with irregular, rather distinct, sparse punctures smoothed on transversal elevation and in depressions behind it. Scutellum divided by distinct transversal arch-shaped ledge into slightly convex anterior and flattened posterior portions. Elytra approximately 1.8 times as long as wide, their sides subparallel along humeral tubercles, then sinuately, very slightly diverging to posterior 2/5 where elytra are widest, then firstly finely arcuately, then slightly sinuately narrowing to separately rounded apices; sides of elytra very finely irregularly serrate, apices with several fine teeth. Elytra with very uneven sculpture, with distinct humeral tubercles, behind them surface of elytra









abruptly falls to lateral margins forming narrow flattened slopes reaching posteriorly nearly to apical 1/6 of elytra, elytral disc with strong longitudinal gibbosities near scutellum and with rather deep irregular depressions medially of humeral tubercles and near suture at anterior 1/3 and posterior 1/6, and irregular poorly defined depressions medially of lateral slopes approximately at the level of 1/2 and posterior 1/3 of elytra. Elytral surface anteriorly with few irregular transversal wrinkles and rather big and rough irregular punctures smoothed medially and posteriorly. Ventral surface laterally with fine irregular arcuate wrinkles, prosternum and central portions of metasternum and abdominal ventrites with small superficial punctures, sculpture smoothed backwards, on last abdominal ventrites nearly invisible. Anal ventrite in male slightly angularly arcuate distally. Male genitalia as in Fig. 1.

Sexual dimorphism: Not determined yet.

Differential diagnose: As in diagnose of the subgenus.

Distribution: Indonesia: West Papua (Doberai Peninsula).

Species group *Endelus* (s. str.) ***bakeri* Kerremans, 1914, gr. nov.**

Body moderately elongated, bronzy-black or dark bronzy with more or less pronounced reddish or greenish-bluish cupreous reflection, sometimes with pattern of irregular greenish or reddish spots. Head large, widened anteriorly, wider or subequal in width to anterior margin of pronotum, frontovertex deeply concave, eyes large, rather convex, oculofrontal margins obtuse. Temples nearly straight or finely sinuate, shorter than or, rarely, subequal in length to eyes. Pronotum widely cordiform, disc with two transversal elevations. Elytra with distinct humeral tubercles, behind them surface of elytra abruptly falls to lateral margins forming narrow flattened slopes reaching posteriorly to level of widest part of elytra, elytral disc uneven with rather deep depressions and distinct elevations.

The representatives of this group can be distinguished by deeply concave frontovertex and especially by strongly uneven elytral surface. From subgenera *Papuadelus* subgen. nov. and *Kubaniellus* Kalashian, 1997 having similar elytral structure, the species of this group differ by the structure of pronotum which in *Kubaniellus* medially bears pair of large and deep transversely oval, rounded or irregular foveae, in *Papuadelus* with single transversal elevation near anterior 1/3; besides, the latter subgenus differs by particular structure of eyes and temples (see above).

Endelus (s. str.) ***bellamyi* sp. nov.** (Plate 51 fig. 7)

Holotype ♂ CSCA: [PHILIPPINES] Puerto Princess, PALAWAN Is., sea level, 2nd growth forest, III.15.47 / CNHM Philippine Zool. Exped. (1946-47), F.G. Werner leg.

Allotype ♀ USNM: same data as in holotype.

Paratypes 5 specimens: 1♂ MKCY: same data as in holotype; 3♂ CSCA & 1♀ MKCY: same data as in holotype but III.20.47.

Derivatio nominis: The new species is dedicated to the blessed memory of Dr. Charles (Chuck) Bellamy, who has made great contribution to our knowledge of Buprestidae.

Description: Body moderately elongate, 2.34-2.45 times as long as wide, bronzy-black with very fine copper lustre, frons in male with golden-greenish, in female with very fine reddish reflection, ventral surface and legs with indistinct violet reflection. Surface without microreticulation, shiny. Body length 3.5-4.05 mm, width 1.45-1.7 mm.

Head large, subequal in width to anterior margin of pronotum. Clypeus deflected back, situated nearly horizontally, transversely triangular, slightly arcuately concave distally. Frons slightly widened posteriorly, frontovertex triangularly concave, concavity posteriorly not reaching anterior margin of pronotum. Postclypeal fovea slightly transversal, large and deep, continued backwards by shallow longitudinal medial groove reaching anterior margin of pronotum, medially with deep rounded fovea. Oculofrontal margins obtuse, rounded, eyes moderately convex, not projecting beyond head outline, in lateral aspect reniform. Temples distinctly shorter than eyes, slightly sinuately diverging from base to posterior margin of eyes. Surface of head with rather large, shallow punctures which are smaller and sparser anteriorly. Antennomeres 1 and 2 big, swollen, 3 and 4 small, slightly elongate, very finely enlarged distally, 5 nearly equilateral, antennomeres 6-11 strongly transversally serrate. Pronotum moderately narrower than elytra, 2.04-2.14 times as wide as long, widely cordiform, widest between mid-length and anterior 1/3, sides inconspicuously irregularly serrate, in anterior 2/3 nearly regularly arcuate, abruptly and sinuately narrowed from anterior 1/3 to nearly rectangular basal angles, anterior margin slightly bisinuate, posterior margin bisinuate with wide trapezoidal medial lobe, posterior angles









sharp. Lateral margins very finely irregularly serrate, bordered with thin edging continued along anterior and posterior margins of pronotum. Pronotum irregularly depressed laterally and along posterior margin, disc convex, with two strong transversal elevations, anterior one shorter, with obtuse edge, posterior elevation longer, with sharp edge, sometimes with small medial depression. Surface covered with large, very flat and indistinct punctures, nearly missing on convex portions of pronotum. Scutellum rather big, triangular, slightly convex. Elytra 1.70-1.80 times as long as wide, with sides slightly diverging near humeri, then sinuately slightly diverging to posterior 2/5 where elytra are widest, then first finely convexly, then slightly sinuately narrowing to separately angularly rounded apices; sides of elytra very finely irregularly serrate, apices with several fine teeth. Elytra with uneven structure, with distinct humeral tubercles, behind them surface of elytra abruptly falls to lateral margins forming narrow flattened slopes reaching posteriorly nearly to apical 1/4-1/5 of elytra, elytral disc with distinct longitudinal gibbosities near scutellum and with rather deep irregular depressions medially of humeral tubercles and near suture at anterior 2/5 and posterior 1/6, and irregular less pronounced depressions medially of lateral slopes approximately at the level of 1/2 and posterior 1/3 of elytral length. Surface of elytra with rather coarse punctures and irregular transversal wrinkles, somewhat smoothed on convex portions of elytra and posteriorly. Ventral surface with indistinct sculpture, sternum and lateral portions of abdominal ventrites with very fine irregular wrinkles, central part of abdomen with traces of small punctures, posteriorly nearly missing. Anal ventrite slightly irregularly arcuate distally. Male genitalia as in Fig. 5.

Sexual dimorphism: Besides coloration of frons sexual dimorphism is very slightly pronounced in the structure of anal ventrite which distally slightly wider in male than in female.

Differential diagnosis: see key below.

Distribution: The Philippines: Palawan.

Endelus (s. str.) ***pseudobelial*** **sp. nov.** (Plate 51 fig. 6)

Holotype ♂ NMPC: Ost (h) Philippinen, Luzon (p) Kasiguran [Casiguran]. S. Boetcher, 9. 1915 (h).

Allotype ♀ ZIN: same data as in holotype, but with additional labels: Typus (p, red paper) / Endelus belial m. Type (h) Det. Dr Obenberger.

Paratypes 5 specimens: 2♂ & 1♀ NMPC, 1♂ MKCY: same data as in holotype; 1♂ NMPC: Philippinen, Luzon (p) Los Baños (h). S. Boetcher, 18 ## 14 (h).

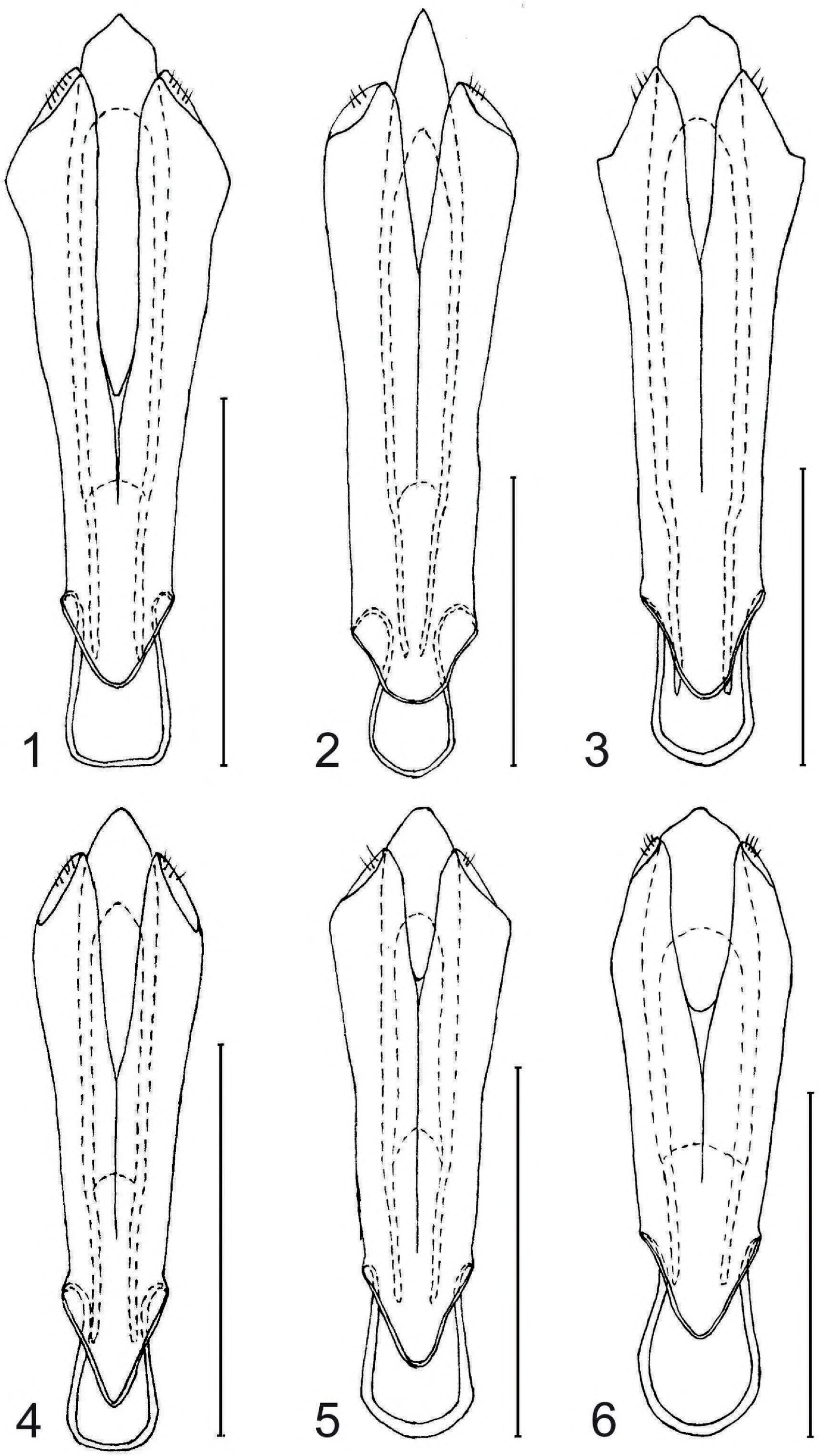
Derivatio nominis: The species name is formed from specific epithet of *E. belial* Obenberger, 1924 and "pseudo-" (false) to stress similarity of both species.

Description: Body moderately elongate, 2.4-2.55 times as long as wide, bronzy-black, sometimes with reddish reflection more visible in head and pronotum, or with irregular reddish or greenish cupreous spots, frons in male with fine greenish luster, in female with indistinct reddish reflection. Surface without microreticulation, shiny. Body length 3.8-4.1 mm, width 1.55 -1.7 mm.

Head large, slightly wider than anterior margin of pronotum. Clypeus deflected back, situated nearly horizontally, nearly equilaterally triangular, moderately arcuately emarginate distally. Frons slightly widened posteriorly, frontovertex deeply triangularly concave, concavity posteriorly not reaching anterior margin of pronotum. Postclypeal fovea slightly transversal, large and deep, continued backwards by shallow longitudinal medial groove reaching anterior margin of pronotum, medially with deep rounded fovea. Oculofrontal margins nearly rectangular, eyes rather convex, not projecting beyond head outline, in lateral aspect reniform. Temples subequal in length to eyes, slightly sinuately diverging from base to posterior margin of eyes. Surface of head covered with large shallow punctures smoothed anteriorly. Antennomeres 1 and 2 big, swollen, 3 and 4 small, slightly elongate, very finely enlarged distally, 5 nearly equilateral, slightly enlarged distally, antennomeres 6-11 strongly transversally serrate. Pronotum distinctly narrower than elytra, 1.95-2.0 times as wide as long, widely cordiform, widest near anterior 1/3, sides inconspicuously irregularly serrate, in anterior 2/3 nearly regularly arcuate, sinuate before posterior angles, anterior margin slightly bisinuate, posterior margin bisinuate with wide trapezoidal medial lobe, posterior angles nearly rectangular. Lateral margins very finely irregularly serrate, bordered with thin edging continued along anterior and posterior margins of pronotum. Pronotum irregularly depressed laterally and along posterior margin, disc convex, with two strong transversal elevations, anterior one shorter, with obtuse edge, posterior elevation longer, with sharp edge, sometimes with small medial depression. Surface covered with large very flat and indistinct punctures, somewhere fused into irregular wrinkles, sculpture nearly missing on convex portions of pronotum. Scutellum rather big, triangular, nearly flat or slightly





Figures 1-6. *Endelus* spp., male genitalia. 1 – *E.* (*Papuadelus* subgen. nov.) *telnovi* sp. nov. (holotype NME); 2 – *E.* (s. str.) *belial* Obenberger, 1924 (topotype MKCY); 3 – *E.* (s. str.) *pseudobelial* sp. nov. (paratype MKCY); 4 – *E.* (s. str.) *palawanensis* Fisher, 1921 (holotype USNM); 5 – *E.* (s. str.) *bellamyi* sp. nov. (paratype MKCY); 6 – *E.* (s. str.) *chalybaeotinctus* Obenberger, 1932 (lectotype NMPC) [scale bar 0.5 mm].



depressed anteriorly. Elytra 1.75-1.85 times as long as wide, with sides slightly diverging near humeri, then sinuately slightly diverging to posterior 2/5 where elytra are widest, then nearly straight or very slightly sinuately narrowing to separately narrowly angularly rounded apices; sides of elytra very finely irregularly serrate, apices with several fine teeth. Elytra with uneven sculpture, with distinct humeral tubercles, behind them surface of elytra abruptly falls to lateral margins forming narrow flattened slopes reaching posteriorly nearly to apical 2/5 of elytra, elytral disc with strong slightly longitudinal gibbosities near scutellum and with rather deep irregular depressions medially of humeral tubercles and near suture at anterior 2/5 and posterior 1/6, and irregular less pronounced depressions medially of lateral slopes approximately at the level of 1/2 and posterior 1/3 of elytra. Surface of elytra with moderately deep small punctures and irregular indistinct transversal wrinkles, somewhat smoothed on convex portions of elytra and posteriorly. Ventral surface with indistinct structure, sternum and lateral portions of abdominal ventrites with very fine irregular wrinkles, central part of abdomen with traces of small punctures, posteriorly nearly invisible. Anal ventrite slightly irregularly arcuate distally. Male genitalia as in Fig. 3.

Sexual dimorphism: Besides coloration of frons sexual dimorphism is very slightly pronounced in the structure of anal ventrite which is distally slightly wider in male than in female.

Differential diagnosis: see key below.

Distribution: The Philippines: Luzon.

Notes on taxonomy and nomenclature of *Endelus*

Endelus (s. str.) ***belial*** **Obenberger, 1924** (Plate 51 fig. 5)

Lectotype ♀ USNM: [Philippines: Luzon] Los Baños, P.I. Baker (p)/ Typus (p, red paper) / 13790 (h) / Endelus belial m. Type (h) Det. Dr Obenberger (p) / Type No. (p) 57725 (h) U.S.N.M. (p, red paper) / Endelus belial Obenb. (h, red paper) / LECTOTYPE (p) Endelus belial Obenb. f* (h) C.L. BELLAMY (p) (red paper).

Paralectotype BMNH, [PHILIPPINES] Los Baños P.I. Baker (p) / Belial Obenb. Baker (h) /1029.31 (h) / belial Obb. (h) PARATYPE (p, red) / NHMUK010584128 [bar code sign] (p).

Additional material: 1♂ MKCY: [PHILIPPINES] Los Baños P.I. Baker (p); 1♀ CSCA: [PHILIPPINES] Tigbao, Leyte, P. L., 17.5.58 ### (h).

References: Obenberger, 1924: 629; Théry, 1926: 37, *E. bakeri* Kerremans, syn.; Théry, 1932: 19, resurrected; Bellamy & Nelson, 1990: 294, lectotype designation.

Distribution: The Philippines: Luzon; new record for Leyte Island.

Notes: Described after unknown number of specimens from "PHILIPPINES: Los Baños (*Baker*)". Due to kindness of Dr. A. Konstantinov and L. Tishechkin I have had the possibility to study photograph of lectotype deposited in USNM and designated by Bellamy and Nelson (1990). Besides, paralectotype from BMNH was studied; this specimen, most probably, provided by Obenberger himself to Théry who labelled it as "paratype". On the other hand, Bellamy and Nelson (*l. c.*) mentioned one specimen from NMPC as paralectotype (without its study). Study of this specimen showed that it is labelled "[PHILIPPINES] Surigao Mindanao Baker (p)/ 1997 (h) / Typus (p, red paper) / Endelus belial m. Type (h) Det. Dr Obenberger"; though it is designated by Obenberger as type, this specimen originated from another locality and it is not belonging to a type series indicated in original description. Moreover, it is not conspecific with types of *E. belial* and belongs to another undescribed species; its description needs additional material.

Endelus (s. str.) ***chalybaeotinctus*** **Obenberger, 1932** (Plate 51 fig. 3)

Lectotype ♂ NMPC, herewith designated: [INDONESIA] Java (h) / Endelus chalybaeotinctus m. Type (h) Det. Dr Obenberger; Paralectotype, NMPC, [Indonesia] F.C. Drescher, Licider Geb, t. Z. v. Babakan, Java. 8.1915 (h) / Typus (p, red paper) / Endelus chalybaeotinctus m. Type (h) Det. Dr Obenberger.

References: Obenberger, 1932: 198.

Distribution: Indonesia: Java Island.

Note. Described after unknown number of specimens; I designated as a lectotype a male specimen from two specimens deposited in NMPC.

Endelus (s. str.) ***inaequalipennis*** **Obenberger, 1937** (Plate 51 fig. 2)

Lectotype ♀ NMPC, herewith designated: [INDONESIA] Java or. (h) / Typus (p, red paper) / Endelus inaequalipennis m. Type (h) Det. Dr Obenberger.

References: Obenberger, 1937: 22.

Distribution: Indonesia: Java Island.

Note: Described after unknown number of specimens, thus I designated as a lectotype a single specimen from NMPC.






Endelus (s. str.) ***palawanensis* Fisher, 1921** (Plate 51 fig. 8)

Holotype ♂ USNM: [PHILIPPINES] p. Princess, Palawan, Baker (p) / 8331 (h) / Type No. (p) 51528 (h) U.S.N.M. (p, red paper) / Endelus palawanae [sic!] Fisher (h, red paper).

Additional material: 1♀ MKCY: [PHILIPPINES] Sorsogon, Luzon (h)/ C.F. Baker collection, 1927 (p); 1♀ NMPC: [PHILIPPINES] Tacloban, Leyte I., p.s., March, 1945 (h)/ on fern, J. Helfer col.

References: Fisher, 1921: 444.

Distribution: Philippines: Palawan Island; new record for Luzon and Leyte islands.

Endelus (s. str.) ***bakeri* Kerremans, 1914** (Plate 51 fig. 4)

Lectotype ♀ NMPC, herewith designated: [PHILIPPINES] Los Baños P.I. Baker (p) / Typus (p, red paper) / Bakeri Kerr. Type (h) / Endelus bakeri Kerr. (h) det. Sv. Bily (p).

References: Kerremans, 1914: 88.

Distribution: Philippines: Luzon.

Note: Bellamy (2008) mentioned BMNH as type depositary basing on single specimen deposited there. The same specimen was used by Théry (1932) for brief description of the species in his review of *Endelus*. But study of this specimen showed that it is labelled "[PHILIPPINES], Mt. Makiling, Luzon, Baker (p) / Endelus bakeri Kerr. co-type (h)" which does not correspond to type locality mentioned by Kerremans (1914) as "Los Baños"; though Mt. Makiling is situated quite near Los Baños city but Kerremans in his work evidently distinguished both localities. Thus we designated as lectotype the specimen from NMPC which completely fit to description, originated from type locality and bearing standard Kerremans' type label. Specimen from BMNH belongs to another undescribed species; its description needs additional material.

Key to the species of *Endelus* (s. str.) *bakeri* Kerremans species group

1 Pronotum wider, more than 1.9 times as wide as long. Elytral sides nearly straight or weakly sinuate before rather narrowly irregularly rounded apices 2
– Pronotum narrower, about 1.8 times as wide as long. Elytral sides distinctly sinuate before rather widely rounded apices. Body 4.35-4.55 mm. Male genitalia as in Fig. 2. The Philippines (Luzon) .... *E. belial* Obenberger, 1924 (Plate 51 fig. 5)
2 Body wider, no more than 2.45 as long as wide 3
– Body slender, 2.55 times as long as wide. Body 4 mm. The Philippines (Luzon) .... *E. bakeri* Kerremans, 1914 (Plate 51 fig. 4)
3 Dorsal surface more distinctly microreticulated, with silky lustre, bronzy with more or less distinct copper-greenish or copper-red pattern. Species from the Greater Sunda Islands (Java) 4
– Dorsal surface shiny, with microreticulation nearly indistinct, bronzy black, sometimes with very indistinct traces of cupreous pattern. Species from the Philippines 5
4 Pronotum wider, 2.2 times as wide as long. Eyes more convex, pointed somewhat forwards. Elytral copper pattern more distinct. Body 3.7-4 mm. Male genitalia as in Fig. 6 ..... . *E. chalybaeotinctus* Obenberger, 1932 (Plate 51 fig. 3)
– Pronotum narrower, 1.95 times as wide as long. Eyes less convex, pointed more sideward. Elytral copper pattern less pronounced. Body 4.1 mm .... *E. inaequalipennis* Obenberger, 1937(Plate 51 fig. 2)
5 Head bigger, slightly wider than anterior margin of pronotum, frontal depression deeper, eyes less convex, subequal in length with temples. Body 3.8-4.1 mm. Male genitalia as in Fig. 3. The Philippines (Luzon) .... *E. pseudobelial* sp. nov. (Plate 51 fig. 6)
– Head smaller, subequal in width to anterior margin of pronotum, frontal depression less pronounced, eyes more convex, distinctly longer than temples 6
6 Pronotum narrower, 1.9 times as wide as long, with sides weaker and less sinuately narrowed from anterior 1/3 to somewhat obtuse basal angles. Eyes more convex. Body 3.7 mm. Male genitalia as in Fig. 4. The Philippines (Palawan, Luzon, Leyte) .... *E. palawanensis* Fisher, 1921 (Plate 51 fig. 8)
– Pronotum wider, 2.05-2.15 times as wide as long, with sides more abruptly and sinuately narrowed from anterior 1/3 to nearly rectangular basal angles. Eyes less convex. Body 3.5-4.05 mm. Male genitalia as in Fig. 5. The Philippines (Palawan) .... *E. bellamyi* sp. nov. (Plate 51 fig. 7)

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Argiolestes spungisi sp. nov. (Odonata: Argiolestidae) from New Guinea

Mārtiņš Kalniņš

The Entomological Society of Latvia, Dzērveņu iela 9-12, LV-2150, Sigulda, Latvia; e-mail: martins.kalnins@biology.lv

Abstract: A new species of *Argiolestes* is described: *Argiolestes spungisi* sp. nov. (type locality: Indonesia, West New Guinea, Doberai Peninsula, Ayamaru village 23 km SE, Aqafu springs, deposited LINC). Ecological notes on habitat (forest brooks) of type locality are given.

Key words: Odonata, damselfly, Zygoptera, Megapodagrionidae, Argiolestidae, *Argiolestes,* taxonomy, New Guinea.

Introduction

Quite recently the former subfamily Argiolestinae of family Megapodagrionidae was raised to family level (Kalkman & Theischinger 2013). The genus *Argiolestes* Selys, 1862 currently includes 12 species, found on New Guinea and adjacent islands, the North Moluccas and on Sulawesi. Most species seem to have small ranges and none is known from more than five records (Kalkman & Theischinger 2013; Kalniņš 2014). The type species of *Argiolestes* is *A. australis* (Guérin-Meneville, 1830).

In this article a new species of *Argiolestes* is described, also concise ecological notes are given.

Materials and methods

Specimens described below were collected using an insect net during hiking in a narrow (ca 10 m broad at the bottom) shady and wet ravine in primary lowland rainforest at Aqafu springs (West New Guinea, Doberai Peninsula, Ayamaru village 23 km SE). The ravine was about 25 m deep at the place where small spring came out from vertical limestone rock forming the wall of the ravine. The stream was almost dry with water dropping from the cliff to the cavities (pools) in the rock. These cavities were about 10 cm diameter and ca 5 cm deep, with no vegetation and no damselfly larvae in them. The water continued overflowing from cavities to the bed of ravine mixing with very moist soil and not forming a course of stream. 10-20 m lower from the spring water accumulated again in small cavities on large pieces of limestone rocks partially forming the bed of the ravine. All visually observed or disturbed specimens were collected. Inspections were made during daytime (from 14:00 to 15:30 o'clock) in sunny weather, with temperature in forest shadow +25-30^{0}C. Humidity was not specially measured, but in the ravine it was pronounced wetter than outside of ravine.

For detailed comparison of characters, a specimen of *A. australis* was studied as well. The studied specimen of *A. australis* was collected in INDONESIA E, 16.02.2012. Raja Ampat, Waigeo Island, Waisai 10-13 km NE, 00˚21'17''S, 130˚54'37''E, ~70 m; primary lowland rainforest on limestone, creek, leg. Dmitry Telnov. The small creek came out from almost vertical limestone rock and was forming a relatively wide, open streambed. The stream stretch was ca 20-30 meters long (between the rock and forest edge / mangroves). The damselflies were flying over and along the stream on the sunny place.

All specimens were preserved in 70 % ethanol. They were studied using a Leica S6D stereomicroscope. Specimen photographs in the laboratory – using a Canon EOS 450D SLR camera attached to the microscope, and CombineZP software was used for image stacking. Holotype and paratypes of the new species are currently deposited in the Latvian Invertebrate collection (LINC) in Sigulda, Latvia. All label data are reproduced exactly, with no corrections or additions. All labels are printed on orange paper.






Abbreviations used in the text:

LINC – Latvian Invertebrate collection (author's collection), Sigulda, Latvia;
Fw – forewings;
Hw – hindwings;
S – abdominal segment(s).

Taxonomic part

Unique characteristics within Argiolestidae

The males of the genus *Argiolestes*, previously considered as *Argiolestes* s. str. (Kalkman et al. 2010), have several well marked characters different from other species of Argiolestidae (Kalkman & Theischinger 2013; Kalniņš 2014):

1. the two apical lobes of the genital ligula are at least four times as long as broad;
2. part of S10 and cerci are pale (whitish or blue in life) contrasting with darker S9 (clearly visible in the field). This is only visible in fully mature specimens and is more easily seen in alive individuals;
3. base of cercus possesses a basal flange in all species except *A. celebensis* Kalkman, 2007 and *A. tuberculiferus* Michalski et Oppel, 2010 (Kalkman 2007; Michalski & Oppel 2010).

Description of new species

***Argiolestes spungisi* sp. nov.** (Figs 1-8, 11, plates 52-54)
http://zoobank.org/82FC7F2D-8B68-4548-8C90-1EC6EB3B6788
Holotype ♂ LINC: INDONESIA E, 04.09.2015. West New Guinea, Doberai Peninsula, Ayamaru village 23 km SE, Aqafu springs, 01°23'15''S, 132°22'04''E, ~330-340 m; primary lowland rainforest on limestone, spring Leg. Dmitry Telnov.
Paratypes 3♂ LINC: same label as in holotype.

Derivatio nominis: Patronymic. This species is named after my teacher in invertebrate zoology and charismatic person assoc. prof. Dr. biol. Voldemārs Spuņģis (Latvian University, Rīga), who supported me in science since 1992.

The description below is based on the male holotype (Plate 52 figs 1 & 5), except measurements, where paratypes (Plate 52 figs 2-4) were used as well. The specimen is relatively well preserved, however the tip of the abdomen (S7-S10 and appendages) are broken off, but all parts are in one tube. Tip of abdomen (S7-S10 and appendages) is broken by paratypic specimen No 1; two legs are missing in this specimen. Tip of abdomen (S8-S10 and appendages) are broken in paratypic specimen No 2; one leg is missing in this specimen. Tip of abdomen (S8-S10 and appendages) and three legs are broken in paratypic specimen No 3; two legs are missing in this specimen. The genital ligula was broken and missing during the photography process. In tube of Paratype No 3. four separate legs were put but I was unable to identify from which paratype they originate. Information on colour pattern is based partly from preserved specimens, who lost the light blue colour on thorax, abdomen and on the face. The paratype specimens correspond very closely to the holotype and confirm the information given on colouration.

Measurements (mm): Total body length 41-42, abdomen (S1-S10, without appendages) 32, Fw 26-27; Pt in Fw 1.9 (costal length), 2.4 (greatest length); Pt in Hw 2.0 (costal length), 2.5 (greatest length).

Head: Labium pale brown with the anterior third shiny dark brown to black. Front of face, including labrum, mandibles, side margins of postclypeus brown (preserved specimen!); anteclypeus dark, and lower posterior corner of genae dull black. The brown colour extends along the margin of the eye; remainder of head including antennae dull black (Plate 53 fig. 1).

Thorax: Prothorax dark brown laterally, but pale with dark brown rings dorsally (Figs 1-4). Shape of anterior and posterior lobe as shown in Figs 5-8, slightly variable between individuals. Ground colour of synthorax is black with a clear pattern as shown in Plate 53 figs 2-3; pattern grayish-brown in the studied specimen. Coxae and trochanters pale brown, femora pale brown, but black at the knees and with a black stripe laterally. Inner side of femora not flattened. Tibiae getting darker from femora to tarsi; tarsi dark brown to black; spines black. The femora of the first, the second and the third pair of legs with respectively 6-8, 7-8, and 10-11 spines on outer side. Tibiae of first pair of legs with 12-13 spines on outer side. Tibiae of second and third pair of legs with 10-13 and 10-12 spines on outer side respectively.

Wings: Fw and Hw hyaline. Venation black. Fw and Hw of equal length and all with 2 Ax. Fw with 22-25 Px; Hw with 22-23 Px. Arculus slightly distal to level of Ax2; discoidal cell in Fw very long, costal side ca 1.5 times as long as distal side, most acute angle ca 40°. Ac closer to Ax1 than to Ax2. Three cells between discoidal cell and subnodus. Pt - dark






brown. 1-3 cells beyond Pt divided. Up to three rows of cells between anal vein and hind margin of Hw. Fields between IR2 and R3, between R3 and IR3, and between IR3 and R4 containing each three or more rows of cells distally (Plate 52 figs 1-4).

Abdomen: S1 and S2 dark brown with ventral half and spots on sides and dorsal part pale brown, S3-S8 dark brown with white marks on sides and ventral part on the anterior fifth. S9 (and some specimens also S8) is dark brown. As can be seen on Plate 54 figs 1-4, almost all of S10 was white (except thin black line in anterior part) when the specimen was alive and this would probably be visible in better-preserved specimens. Hind margin of S10 without spines and slightly depressed in the middle. Epiproct is upturned and prominent in dorsal view. Shape of superior appendages shown on the Plate 54 figs 1-8 with basal flange slightly variable between individuals. Both superior and inferior appendages are white; inferiors ca 1/3 the length of superiors. As can be seen in Plate 54 figs 5-8, the inferior appendages have conical tips and show slight variability between individuals. Basal flange of superior appendages almost 1/2 their length. Lower apical flange of superior appendages are moderately expanded and simple. Upper flange are far less prominent and visible mainly due to a row of black blunt denticles. The apical part of the lower apical flange is divided from the apex of the appendages by a moderate incision. Outer border of superior appendages bears two to three moderately large and one or two small spines. Genital ligula as shown in Fig. 11, with two very long and slender lateral horns.

The following photos showing characters of the *A. australis* (Guérin-Meneville, 1830) are given for comparison: head (Plate 53 fig. 4), thorax (Plate 53 fig. 5), prothorax (Figs 9-10), male accessory genitalia (Fig. 12) and tip of abdomen (Plate 54 figs 9-10) as well.

Differential diagnosis: Males of *Argiolestes spungisi* sp. nov. have short inferior appendages which are less than half (ca 1/3) the length of superior appendages. This character is only shared with *A. australis*, *A. celebensis*, *A. tuberculiferus* and *A. pallidistylus* Selys, 1878. *Argiolestes spungisi* sp. nov. can be distinguished from other congeners by the inferior appendages (*A. spungisi* sp. nov. has conical tips while *A. australis* has rounded tips); superior appendages with an inner basal flange which runs along the axis of the appendages for a third or half of the length (inner basal flange absent in superior appendages of *A. celebensis* and *A. tuberculiferus*); and lack of large pale spots with well-defined marks on front and sides of thorax (in *A. pallidistylus* large blue marks present on front of thorax and markings on side of thorax are blurred).

Ecological notes: Individuals of *A. spungisi* sp. nov. were observed slowly flying one by one (not in groups) around the spring and the cavities (approximately 4-5 m^2), 0.3 m above the water surface. They were barely visible at dusk of the ravine, as their bodies are brownish like the old limestone rock and their wings are transparent. All *A. spungisi* sp. nov., arriving one by one in a period of ca 30 mins, were collected. At the observation date, rain had not fallen for nearly 4 months in the region according to the data collected from locals. It is possible at rainy times the water level in the springs and ravine is significantly higher than at the time of observation.

Discussion

According to Kalkman et Theischinger (2013) the species of *Argiolestes* occur on New Guinea and adjacent islands, the northern Moluccas and on Sulawesi. The new records of *A. spungisi* sp. nov. partly fill the gap in distribution of *Argiolestes* on New Guinea between records of *A. roon* on Roon and Mioswaar islands, *A. pallidistylus* on Vogelkop (= Doberai) Peninsula and *A. australis* on Waigeo Island and near Sorong on Vogelkop Peninsula (Kalkman et al. 2010; Kalkman & Orr 2013). The known range of *Argiolestes* is now larger to meanwhile available unidentified specimens from several places on Onin Peninsula collected by the author and by Dmitry Telnov (Map 1). Together with here described *A. spungisi* sp. nov., the genus *Argiolestes* includes 13 species. The current finding of *A. spungisi* sp. nov. complements and confirms current limited information on habitats of the genus *Argiolestes*, namely that the larvae probably live in seepages and small brooks in forest. According to the observations of *Argiolestes* by various authors (c.f. Kalkman & Theischinger 2013; Kalniņš 2014), most individuals were flying or resting in almost totally shaded streams or in shaded stream stretches. However the recent observation of *A. australis* on Waigeo Island (see Introduction) shows that not all species or specimens avoid sun exposed places (Plate 55 figs 1-2).

Acknowledgements

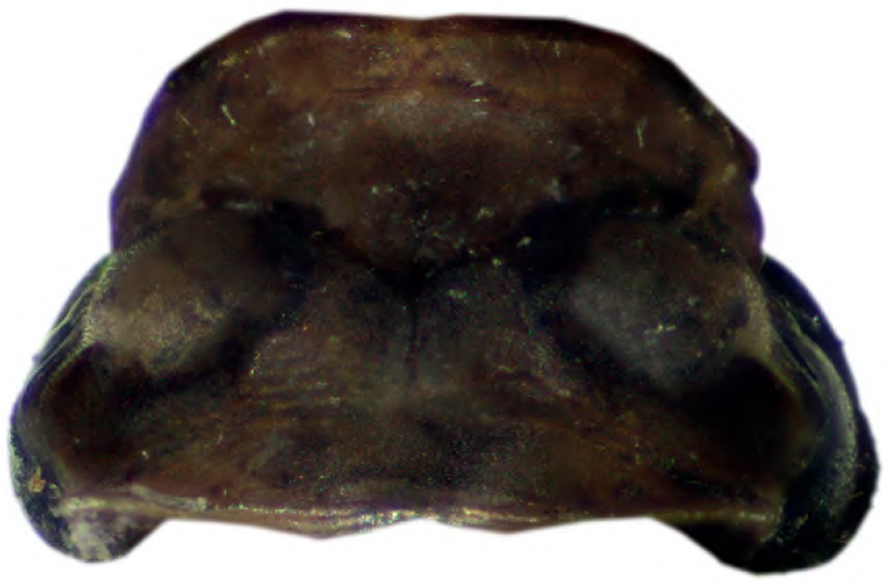
I am greatly indebted to Dmitry Telnov (The







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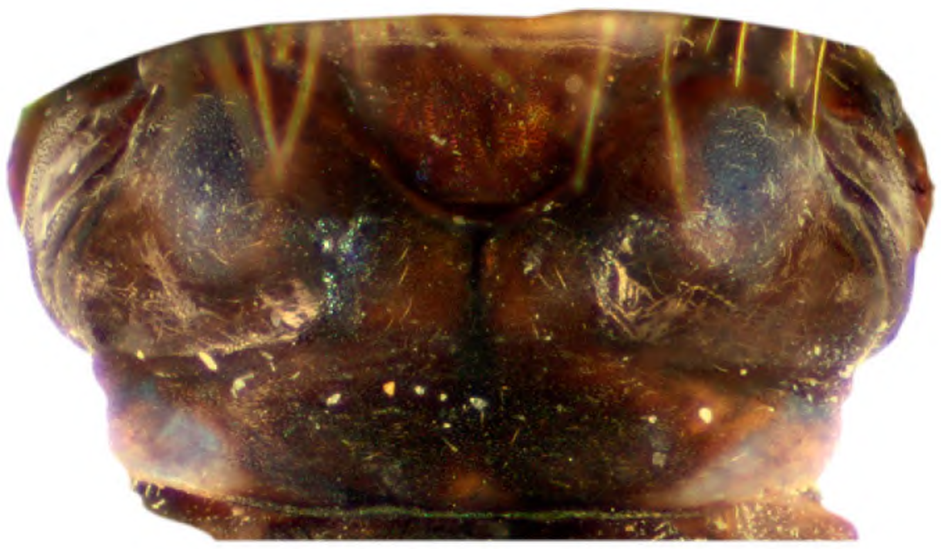
Figures 1-8. *Argiolestes spungisi* sp. nov., prothorax by dorsal (1-4) and lateral (5-8) view. 1 & 5 – Holotype; 2-4 & 6-8 – Paratypes 1, 2, and 3 respectively.











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Figures 9-10. *Argiolestes australis* (Guérin-Meneville, 1830), prothorax, dorsal (9) and lateral (10) view.



11



12

Figures 11-12. Male accessory genitalia of Papuan *Argiolestes*, ventral view. 11 – *A. spungisi* sp. nov., paratype 3; 12 – *A. australis* (Guérin-Meneville, 1830), specimen from Waisai 10-13 km NE, Waigeo Island.



Entomological Society of Latvia, Rīga) for providing dragonfly material from New Guinea and for valuable suggestions useful in the preparation of the final version of the article, to Laszlo Wagner (www.east-indonesia.info) for guiding and help in expeditions, to Vincent J. Kalkman (Naturalis Biodiversity Centre, Leiden, the Netherlands) for providing literature on the Australasian region, to Günther Theischinger (Office of Environment and Heritage, Sydney, Australia) for reviewing the manuscript, and to Māris Lielkalns (Rīga Zoo, Rīga, Latvia) for processing figures.

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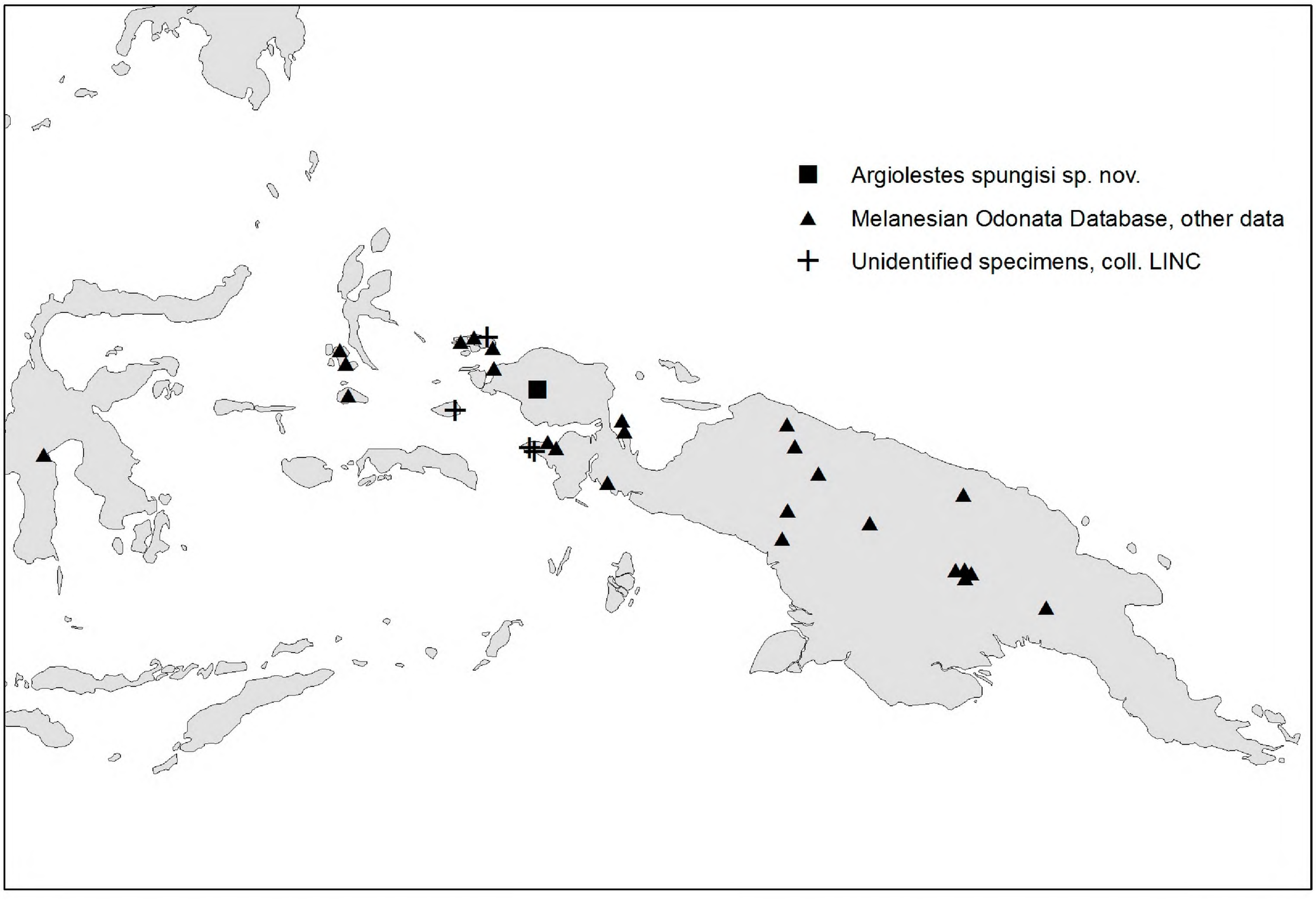
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Map 1. Distribution of *Argiolestes* s. str. based on records in the Melanesian Odonata Database with locality of *Argiolestes spungisi* sp. nov. and localities of unidentified specimens (map updated from Kalkman & Theischinger 2013 and Kalniņš 2014).






A mimetic assemblage of net-winged beetles (Coleoptera: Lycidae) from West Papua

Sergey V. Kazantsev [1], **Dmitry Telnov** [2]

1 – Insect Centre, Donetskaya Str. 13-326, 109651, Moscow, Russia; e-mail: kazantss@mail.ru
2 – Dārza iela 10, Stopiņu novads, LV-2130, Dzidriņas, Latvia; e-mail: anthicus@gmail.com

Abstract: A new genus, *Metrioguinus* Kazantsev gen. nov., and eight new species of Net-winged beetles, namely *Cautires albonigrus*, *Cladophorus dmitryi*, *Metrioguinus kristinae*, *M. vikhrevi*, *Plateros candidus*, *Porrostoma arfakense*, *Xylobanus albipennis* and *X. mauroleucus* Kazantsev spp. nov. - are described from western New Guinea. All described taxa belong in one mimetic assemblage, characterized by black distally and whitish yellow proximally elytra. These lycids are mimicked by other coleopterans (Cantharidae, Chrysomelidae) from the same habitat.

Key words: Coleoptera, Lycidae, Metriorrhynchini, new species, mimicry, Papuan region.

Introduction

An assemblage of net-winged beetles collected at ca. 1900-2450 m above sea level in the Arfak Mountains in West Papua (Eastern Indonesia) that at a first glance appeared to include two or three species in fact turned out to represent seven species belonging in six different genera from two tribes, Metriorrhynchini and Platerotini. All seven were found to be new to science and one of them turned out to belong to an undescribed genus. Another new species of a similar coloration pattern was found in a distant New Guinean locality, but at approximately the same altitude.

In the present paper a new genus and eight new species from the genera *Cautires* Waterhouse, 1879, *Cladophorus* Guerin-Meneville, 1830, *Metrioguinus* gen. nov., *Plateros* Bourgeois, 1879, *Porrostoma* Laporte, 1838, and *Xylobanus* Waterhouse, 1879 are described and the mimicry of the complex that includes also representatives of Cantharidae and Chrysomelidae is discussed.

Materials and methods

The studied specimens were glued on cardboard or transparent plastic mounting plates. For detailed examination they were relaxed in water; then the detached ultimate abdominal segments were treated for several hours in 10% KOH at room temperature, then, with the extracted genitalia, placed in microvials with glycerin; or glued back on mounting plates, along with the extracted genitalia, without the KOH treatment.

MSP-1 zoom stereoscopic dissecting microscope with x8–x80 magnification range was used. Photographs were taken with Canon EOS 6D camera and Canon MP-E 65 mm lens.

Abbreviations used in the text:

DTC – private collection of Dmitry Telnov, Rīga, Latvia;
ICM – Insect Center, Moscow, Russia;
NME – Naturkundemuseum Erfurt, Germany.

Taxonomic part

Metriorrhynchini Kleine, 1926

Type genus: *Metriorrhynchus* Gemminger, Harold, 1869

Cautires Waterhouse, 1879

Cautires Waterhouse, 1879: 36.
Type species: *Cautires excellens* Waterhouse, 1878, subsequent designation by Bourgeois, 1891

Note: Several dozen *Cautires* Waterhouse, 1879 species have been reported from New Guinea and adjacent islands (e.g. Kleine 1926, 1933; Kazantsev 2010).
Distribution: Distributed in East Palaearctic, Oriental, Afrotropical and Papuan regions (Kleine 1933). Most species from New Guinea seem to be






different from the type species of the genus (Bocák 2002), so more alpha taxonomic work is essential to determine their taxonomic position.

***Cautires albonigrus* Kazantsev sp. nov.** (Plate 56 figs 1-3)

Holotype ♂ NME: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, Anggi Gigi Lake S env., Uper vill. 2-2,5 km NNE, 1°17'10S, 133°54'18"E, 09.IX.2015, 1900-2480 m, primary mid montane rainforest, leg. D.Telnov.

Derivatio nominis: The name of the new species is derived from the Latin for "white" and "black", alluding to its coloration.

Measurements: Length 7.4 mm, width across humeri 1.4 mm.

Description: Black. Elytral proximal half whitish yellow. Head without rostrum. Vertex with fine median groove behind antennal prominence ending in inconspicuous broad W-shaped impression. Eyes small, interocular distance ca. 1.7 times greater than eye diameter. Labrum small, transverse. Palps slender; ultimate palpomeres elongate, almost pointed distally and glabrous at apex. Antennal sockets separated by minute lamina. Antennae attaining to elytral five sixths, from antennomere 3 flabellate; antennomere 3 ca. 4 times longer than antennomere 2 and 1.3 times shorter than antennomere 4; flabellae of antennomeres 3-5 ca. 3.4 times longer than relevant antennal stem; antennomeres 3-11 with short erect pubescence (Plate 56 fig. 1). Pronotum transverse, ca. 1.5 times as wide as long, trapezoidal, bisinuate basally and semi-circularly produced anteriorly, with slightly concave sides, conspicuous acute posterior and evident blunt anterior angles; median cell rhomboidal, relatively broad, reaching anterior margin; lateral carinae narrow, curved; anterior cells diverging anteriorly, formed by straight antero-lateral carinae, not quite attaining to anterior margin. Mesothoracic spiracle small, hooded; hood narrow, erect. Scutellum transverse, slightly narrowing distally, broadly emarginate at apex (Plate 56 fig. 1). Elytra long, ca. 4 times longer than wide at humeri, parallel-sided, with four relatively weak, equally developed primary costae; interstices with double rows of irregular subquadrate cells; bottom of cells hairless; pubescence dense, short and sub-erect (Plate 56 fig. 1). Tibiae and femoris relatively long, straight and narrow; tarsomeres 3-4 feebly widened, with plantar pad (tarsomeres 1 and 2 with minute apical plantar pad). Male aedeagus with gradually widened distally and broad at distal two thirds in lateral view median lobe; inner sac with scissors-like structure; phallobasal membrane attaining to ca. 0.3 length of median lobe (Plate 56 figs 2-3).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Cautires albonigrus* Kazantsev sp. nov. is readily separable from all congeners by the coloration, relatively long male antennal flabellae and the shape of the median lobe of the aedeagus (Plate 56 figs 1-3).

Distribution: Known only from the Arfak Mountains in Doberai (Bird's Head) Peninsula of West New Guinea.

***Cladophorus* Guerin-Meneville, 1830**

Cladophorus Guerin-Meneville, 1830: plate II, fig. 9.

Type species: *Cladophorus formosus* Guerin-Meneville, 1830, subsequent designation by Waterhouse, 1878

= *Odontocerus* Guerin-Meneville, 1830: 72.

Type species: *Cladophorus formosus* Guerin-Meneville, 1830, subsequent designation by Bourgeois, 1892

Note: Several dozen *Cladophorus* Guerin-Meneville, 1830 species are known from New Guinea (Kleine 1926; 1933).

Distribution: Papuan and Australian regions.

***Cladophorus dmitryi* Kazantsev sp. nov.** (Plate 56 figs 4-6)

Holotype ♂ NME: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, Anggi Gigi Lake S env., Uper vill. 2-2,5 km NNE, 1°17'10S, 133°54'18"E, 09.IX.2015, 1900-2480 m, primary mid montane rainforest, leg. D.Telnov.

Paratypes 2 ♂ ICM & DTC: same label as in holotype.

Derivatio nominis: Patronymic. The new species is named after Dr. Dmitry Telnov (The Entomological Society of Latvia, Rīga) who collected the type series.

Measurements: Length 15.5-17.8 mm, width across humeri 3.4-3.7 mm.

Description: Black; underside with faint bluish metallic tint. Pronotum orange testaceous; broad band at elytral proximal two thirds, except at basal sixth, light gray. Head without rostrum. Vertex with two deep round impressions behind antennal prominence. Eyes large, interocular distance ca. 1.7 times greater than eye diameter. Labrum small, transverse, truncate anteriorly; epistoma concave. Palps short; ultimate palpomeres massive, conspicuously widened distally and oblique at apex.






Antennal sockets separated by narrow triangular lamina. Antennae attaining to elytral three fourths, from antennomere 3 flabellate; antennomere 3 ca. 9 times longer than antennomere 2 and 1.1 times longer than antennomere 4; flabellum of antennomere 3 ca. 2.4 times, flabellae of antennomeres 4 and 5 ca. 3 times longer than relevant antennal stem; antennomeres 3-11 with short erect pubescence (Plate 56 fig. 4). Pronotum transverse, ca. 1.5 times as wide as long, densely pubescent, trapezoidal, bisinuate basally and triangularly produced anteriorly, with explanate sides, truncate posterior and evident blunt anterior angles; median cell narrow, extending to pronotal 0.75; lateral carinae obliterate; anterior cells noticeable only basally, antero-lateral carinae almost complete obsolete. Mesothoracic spiracle massive, hooded; hood long, bent backwards. Scutellum subquadrate, triangularly emarginate at apex (Plate 56 fig. 4). Elytra long, ca. 3.8 times longer than wide at humeri, noticeably widened distally, with four equally developed primary costae; interstices with double rows of regular subquadrate cells; pubescence uniform, dense, short and decumbent (Plate 56 fig. 4). Tibiae and femoris straight, narrow; tarsomeres 2-4 widened, tarsomeres 1-4 with prominent plantar pad. Male aedeagus with straight, relatively narrow, gradually widened distally and constricted near apex median lobe; inner sac with bipod elongate structure; phallobasal membrane attaining to ca. 0.3 length of median lobe (Plate 56 figs 5-6).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Cladophorus dmitryi* Kazantsev sp. nov. is readily separated from congeners by the coloration, small eyes, broad pronotum with actually absent lateral and antero-lateral carinae and narrow straight median lobe of the aedeagus (Plate 56 figs 4-6).

Distribution: Known only from the Arfak Mountains in Doberai (Bird's Head) Peninsula of West New Guinea.

***Metrioguinus* Kazantsev gen. nov.**

Type species: *Metrioguinus kristinae* sp. nov.

Derivatio nominis: The name of the new species is derived from the genus name *Metriorrhynchus* Gemminger et Harold, 1869, the type genus of Metriorrhynchini, where the new genus belongs, and the geographic name New Guinea, alluding to its distribution.

Description: Alate, slender, elongate. Head transverse, almost flat between eyes behind antennal prominence, noticeably narrowed behind eyes. Fastigium blunt. Eyes relatively small, semispherical. Labrum small, transverse; frons and labrum densely pubescent; epistoma concave. Mandibles slender, evenly rounded. Maxillary palps 4-segmented, with ultimate palpomere massive, widened and flattened distally. Labial palps 3-segmented, considerably shorter than maxillary palps, with large ultimate palpomere. Antennal prominence moderately bulging; antennal sockets separated by narrow lamina. Antenna 11-segmented, long, narrow, filiform, round in cross-section; pedicel (antennomere 2) considerably shorter than antennomere 3, antennomeres 3 and 4 subequal in length; antennomeres 3-11 with short sub-erect pubescence (Plate 57 fig. 1). Pronotum about as wide as long, slightly more narrow than elytra, with well noticeable posterior and rounded anterior angles; median cell wedge-shaped, connected with anterior margin by carina; antero-lateral and lateral carinae well developed. Elytra narrow, parallel-sided, with four relatively weak, equally developed primary costae; interstices with double row of small regular cells (Plate 57 fig. 1). Legs long; trochanters longer than wide, narrow, considerably shorter than femurs, connected to femora distally; femurs and tibiae only slightly flattened; tibial spurs minute; tarsomeres narrow; tarsomeres 1 and 2 with apical plantar pad; all claws simple. Male proctiger attached to paraproct; paraproct divided by median suture, triangularly incised at proximal margin; ultimate ventrite elliptical, with symmetric, relatively short and broad, proximally widened and rounded spiculum gastrale, externally with spine formed by longer bristles (Plate 57 figs 2-3). Aedeagus more or less symmetric, with narrow elongate median lobe; inner sac structures mostly sclerotized, evaginated; phallobase anuliform, relatively broad; phallobasal membrane not sclerotized (Plate 57 figs 4-5).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Metrioguinus* Kazantsev gen. nov. is readily separable from other genera of Metriorrhynchini by the the combination of filiform, round in cross-section antennae, seven-areola pronotum and completely evaginated inner sac structures of the aedeagus (Plate 57 figs 1-5). The pronotal structure of the new genus is very similar to that of *Cautires* Waterhouse or *Xylobanus* Waterhouse, but its antennae and male copulatory organs are very unlike those of the two genera. As a matter of fact, the filiform, round in cross-section antennae and completely evaginated inner sac structures of the aedeagus have not been reported among the Metriorrhynchinae, where more than a thousand species have already been described. On





the other hand, the aforesaid morphologies often come across in other lycid lineages. For instance, a similar type of the aedeagus is typical of *Mesolycus* Gorham, 1883 of the tribe Macrolycini, while the same antennal structure is widespread in Calochromini, Dictyopterini, Platerotini, etc. Nevertheless, the characteristic seven-areola pronotum and circular phallobase with developed phallobasal membrane place the taxon in Metriorrhynchini.

Distribution: Known only from western New Guinea.

***Metrioguinus kristinae* Kazantsev sp. nov.** (Plate 57 fig. 1-5)

Holotype ♂ NME: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, Anggi Gigi Lake S env., Uper vill. 2-2,5 km NNE, 1°17'10S, 133°54'18"E, 09.IX.2015, 1900-2480 m, primary mid montane rainforest, leg. D.Telnov.

Paratype 1♂ ICM: same label as in holotype.

Derivatio nominis: The new species is named after Kristine Greķe (Rīga, Latvia), who participated in 2007, 2009, 2010 and 2013 to Entomological Society's of Latvia Papuan region expeditions and personally collected several interesting Lycidae.

Measurements: Length 5.8-6.1 mm, width across humeri 1.0-1.1 mm.

Description: Dark brown to black. Elytral proximal two fifths whitish yellow. Head without rostrum. Vertex with narrow median groove behind antennal prominence. Eyes small, interocular distance ca. 1.7 times greater than eye diameter. Labrum densely punctate, inconspicuously emarginate medially. Ultimate palpomeres elongate, oval and flattened at apex. Antennae attaining to elytral two thirds, filiform; antennomere 3 ca. 5 times longer than antennomere 2 and 1.1 times shorter than antennomere 4; antennomeres 3-11 with short erect pubescence (Plate 57 fig. 1). Pronotum slightly wider than long, anteriorly roughly rugulose, slightly bisinuate basally and semi-circular anteriorly, with small acute laterally produced posterior and rounded anterior angles; median cell moderately broad, extending to pronotal 0.65; lateral carinae somewhat concave; anterior cells diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle small, not protruding, with minute erect anterior hood. Scutellum subquadrate, slightly narrowing distally, triangularly emarginate at apex (Plate 57 fig. 1). Elytra long and narrow, ca. 4.3 times longer than wide at humeri, parallel-sided, with four equally developed primary costae; interstices with double rows of regular subquadrate cells; pubescence dense, short and decumbent, concealing reticulation (Plate 57 fig. 1). Femurs and tibiae straight, narrow, subequal in length; tarsomere 4 slightly widened, tarsomeres 1-4 with plantar pad, tarsomeres 1-2 with apical plantar pad. Male ultimate ventrite ca. 2.5 times longer than wide, bristles forming spine ca. 5 times longer than surrounding pubescence (Plate 57 figs 2-3). Aedeagus with slightly widened medially and bent in lateral view median lobe; inner sac with ring-like and paired toothed cover distal structure; phallobasal membrane attaining to ca. 0.4 length of median lobe (Plate 57 figs 4-5).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Metrioguinus kristinae* Kazantsev sp. nov. is readily distinguishable from *M. vikhrevi* Kazantsev sp. nov., the only other member of the genus, by the coloration and widened medially median lobe of the aedeagus with differently shaped inner sac structures (Plate 57 figs 1-3).

Distribution: Known only from the Arfak Mountains in Doberai (Bird's Head) Peninsula of West New Guinea.

***Metrioguinus vikhrevi* Kazantsev sp. nov.** (Plate 57 fig. 6-8)

Holotype ♂ ICM: E Indonesia, Papua, env. Wamena Baliem Reserve, 04°06'S, 139°03'E, 2000 m, 16-25. XII.2014, N. Vikhrev leg.

Derivatio nominis: Patronymic. The new species is named after Dr. Nikita Vikhrev (Moscow, Russia), who collected the unique type specimen.

Measurements: Length 5.4 mm, width across humeri 1.1 mm.

Description: Dark brown to black. Elytral proximal fourth, except shoulders and scutellar area, whitish yellow. Head without rostrum. Vertex with median groove behind antennal prominence. Eyes small, interocular distance ca. 1.5 times greater than eye diameter. Palps slender; ultimate palpomeres relatively large, elongate, oval and flattened at apex. Antennal sockets separated by narrow lamina. Antennae attaining to elytral three fourths, filiform; antennomere 3 ca. 5 times longer than antennomere 2 and 1.1 times shorter than antennomere 4; antennomeres 3-11 with short erect pubescence (Plate 57 fig. 6). Pronotum transverse, ca. 1.3 times as wide as long, slightly bisinuate basally and semi-circularly produced anteriorly, with conspicuous acute posterior and rounded blunt anterior angles; median cell moderately broad, extending to pronotal 0.6; lateral carinae somewhat concave; anterior cells diverging anteriorly, formed by obliter-






ate near anterior margin antero-lateral carinae. Mesothoracic spiracle minute, not protruding. Scutellum subquadrate, slightly narrowing distally, feebly emarginate at apex (Plate 57 fig. 6). Elytra long, ca. 4.1 times longer than wide at humeri, parallel-sided, with four equally developed primary costae; interstices with double rows of irregular roundish cells; pubescence dense, short and semi-erect (Plate 57 fig. 6). Femurs and tibiae straight, narrow, subequal in length; tarsomere 4 slightly widened, tarsomeres 1-4 with plantar pad, tarsomeres 1-2 with apical plantar pad. Male aedeagus with widened apically and bent in lateral view median lobe; inner sac with gripping distal structure; phallobasal membrane attaining to ca. 0.4 length of median lobe (Plate 57 figs 7-8).

Sexual dimorphism: Female unknown.

Differential diagnosis: *Metrioguinus vikhrevi* Kazantsev sp. nov. is readily separable from *M. kristinae* Kazantsev sp. nov. by the coloration and not widened medially median lobe of the aedeagus with differently shaped inner sac structures (Plate 57 figs 6-8).

Distribution: Known only from Central Cordillera of New Guinea (East Indonesia).

Xylobanus Waterhouse, 1879

Xylobanus Waterhouse, 1879: 38.

Type species: *Lycus costifer* Walker, 1858: 282, original designation

Note: The genus *Xylobanus* Waterhouse, 1879, a widespread and species-rich Old World genus, has so far listed eighteen New Guinean species (Kleine 1933, 1935; Kazantsev 2015b).

Distribution: Distributed in East Palaearctic, Oriental, Afrotropical, Australian and Papuan regions (Kleine 1933).

***Xylobanus albipennis* Kazantsev sp. nov.** (Plate 58 figs 1-3)

Holotype ♂ NME: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, Anggi Gigi Lake S env., Uper vill. 2-2,5 km NNE, 1°17'10S, 133°54'18"E, 09.IX.2015, 1900-2480 m, primary mid montane rainforest, leg. D.Telnov.

Paratypes 2 ♂ IMC & DTC: same label as in holotype.

Derivatio nominis: The name of the new species is derived from the Latin for "with white wings", alluding to its coloration.

Measurements: Length 5.6-6.9 mm, width across humeri 1.0-1.2 mm.

Description: Dark brown to black. Proximal pronotal half whitish yellow. Head without rostrum. Vertex with transverse impression behind antennal prominence. Eyes small, interocular distance ca. 1.7 times greater than eye diameter. Labrum small, transverse, rounded anteriorly. Palps slender; ultimate palpomeres elongate, pointed distally and glabrous at apex. Antennal sockets separated by narrow lamina. Antennae attaining to elytral three fifths, from antennomere 3 flattened and slightly serrate; antennomere 3 ca. 7 times longer than antennomere 2 and subequal in length to antennomere 4; antennomeres 3-11 with short decumbent pubescence (Plate 58 fig. 1). Pronotum transverse, ca. 1.3 times as wide as long, trapezoidal, bisinuate basally and convex anteriorly, with straight sides, inconspicuous acute posterior and evident blunt anterior angles; median cell broad, extending to pronotal 0.7; lateral carinae conspicuously weakened; anterior cells diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle small, slightly protruding, not hooded. Scutellum subquadrate, slightly narrowing distally, semi-circularly emarginate at apex (Plate 58 fig. 1). Elytra long, ca. 4.6 times longer than wide at humeri, parallel-sided, with four equally developed in proximal half primary costae, with costae 2 and 4 noticeably stronger in distal half; interstices with single row of large regular subquadrate cells; bottom of cells hairless; pubescence scarce, short and semi-erect (Plate 58 fig. 1). Tibiae and femoris straight, narrow; tarsomeres not widened, tarsomeres 1 and 2 without plantar pad. Male aedeagus with short, robust, conspicuously widened distally and rounded at apex median lobe, slightly curved in lateral view; phallobasal membrane short, ca. 0.3 length of median lobe (Plate 58 figs 2-3).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Xylobanus albipennis* Kazantsev sp. nov. is readily separated from the congeners by the coloration, slender elongate body and short, robust, conspicuously widened distally median lobe of the aedeagus (Plate 58 figs 1-3).

Distribution: Known only from the Arfak Mountains in Doberai (Bird's Head) Peninsula of West New Guinea.

***Xylobanus mauroleucus* Kazantsev sp. nov.** (Plate 58 figs 4-6)

Holotype ♂ NME: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, Anggi Gigi Lake S env., Uper vill. 2-2,5 km NNE, 1°17'10S, 133°54'18"E, 09.IX.2015, 1900-2480 m, primary mid montane rainforest, leg. D.Telnov.






Derivatio nominis: The name of the new species is derived from the Greek for “black and white”, alluding to its coloration.
Measurements: Length 6.8 mm, width across humeri 1.6 mm.
Description: Dark brown to black. Proximal pronotal two fifths whitish yellow. Head without rostrum. Vertex almost flat behind non-bulging antennal prominence. Eyes small, interocular distance ca. 1.5 times greater than eye diameter. Labrum transverse, short, slightly emarginate medially; epistoma nearly truncate. Palps slender; ultimate maxillary palpomere relatively short, slightly widened distally and nearly truncate at apex. Antennal sockets separated by minute triangular lamina. Antennae attaining to elytral two thirds, from antennomere 3 flattened and serrate; antennomere 3 ca. 8 times longer than antennomere 2 and ca. 1.2 times longer than antennomere 4; antennomeres 3-11 with short dense erect pubescence (Plate 58 fig. 1). Pronotum transverse, ca. 1.4 times as wide as long, slightly bisinuate basally and semi-circular anteriorly, with almost parallel, concave before posterior angles sides, conspicuous acute posterior and rounded anterior angles; median cell broad, extending to pronotal 0.7; lateral carinae conspicuous, almost straight; anterior cells almost not diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle small, hooded; hood narrow, erect. Scutellum transverse, slightly narrowing distally, triangularly emarginate at apex (Plate 58 fig. 1). Elytra long, ca. 3.8 times longer than wide at humeri, parallel-sided, noticeably broader than pronotum, with four equally developed primary costae; interstices with single row of large regular subquadrate cells; bottom of cells hairy; pubescence dense, short and decumbent (Plate 58 fig. 1). Tibiae and femoris straight, narrow; tarsomeres 3-4 widened, all tarsomeres with plantar pad (tarsomeres 1 and 2 with minute apical plantar pad). Male aedeagus with bullet-shaped median lobe, proximally convex in lateral view; inner sac with scissors-like structure; phallobasal membrane short, ca. 0.3 length of median lobe (Plate 58 figs 2-3).
Sexual dimorphism: Female is unknown.
Differential diagnosis: *Xylobanus mauroleucus* Kazantsev sp. nov. is easily distinguishable from the similarly coloured *X. albipennis* Kazantsev sp. nov. by the more serrate antennae, more transverse, but noticeably more narrow than elytra pronotum and relatively shorter elytra, structure of mesothoracic spiracles, tarsomeres, etc., as well as by the bullet-shaped median lobe of the aedeagus with scissors-like inner sac structure (Plate 58 figs 4-6).
Distribution: Known only from the Arfak Mountains in Doberai (Bird’s Head) Peninsula of West New Guinea.

***Porrostoma* Laporte, 1838**

Porrostoma Laporte, 1838: 26.
Type species: *Lycus rufipennis* Fabricius, 1801, by monotypy

Note: The genus *Porrostoma* Laporte, 1838 is widespread in New Guinea, but is more species-rich in Australia (Kleine 1933). Seven species from New Guinea were added to this genus recently (Kazantsev 2015b).
Distribution: Papuan and Australian regions (Kleine 1933).

***Porrostoma arfakense* Kazantsev sp. nov.** (Plate 59 figs 1-3)

Holotype ♂ NME: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, Anggi Gigi Lake S env., Uper vill. 2-2,5 km NNE, 1°17’10S, 133°54’18”E, 09.IX.2015, 1900-2480 m, primary mid montane rainforest, leg. D.Telnov.

Derivatio nominis: The name of the new species is derived from the Arfak Mountains where the unique type specimen was collected.
Measurements: Length 5.3 mm, width across humeri 1.1 mm.
Description: Dark brown to black. Proximal pronotal fifth whitish yellow. Head without rostrum. Vertex with inconspicuous transverse impression behind antennal prominence. Eyes small, interocular distance ca. 1.6 times greater than eye diameter. Labrum small, transverse, truncate anteriorly; epistoma concave. Palps slender; ultimate palpomeres narrow, elongate, almost pointed distally and glabrous at apex. Antennal sockets separated by minute lamina. Antennae from antennomere 3 broad, serrate; antennomere 3 ca. 4.5 times longer than antennomere 2 and subequal in length to antennomere 4; antennomeres 3-11 with short dense sub-erect pubescence (Plate 59 fig. 1). Pronotum transverse, ca. 1.3 times as wide as long, feebly bisinuate basally and convex anteriorly, with slightly concave sides, inconspicuous acute posterior and evident blunt anterior angles; median cell moderately broad, extending to pronotal 0.6; lateral carinae inconspicuous medially, concave; anterior cells slightly diverging anteriorly, formed by obliterate near anterior margins antero-lateral carinae. Mesothoracic spiracle small, non-protruding, not






hooded. Scutellum transverse, slightly narrowing distally, triangularly emarginate at apex (Plate 59 fig. 1). Elytra long, ca. 4 times longer than wide at humeri, parallel-sided, with four equally developed primary costae, except weakened in distal fourth primary costa 3; all interstices with double rows of small roundish cells, except single row of cells in interstices 1-3 medially below the middle; bottom of cells glabrous; pubescence scarce, short and decumbent (Plate 59 fig. 1). Tibiae and femora straight, narrow; tarsomere 4 slightly widened, tarsomere 1 without plantar pad. Male aedeagus with relatively narrow, curved median lobe; inner sac with trilobate distal structure covered with minute thorns; phallobasal membrane elongate, sclerotized, attaining to ca. 0.7 length of median lobe (Plate 59 figs 2-3).

Sexual dimorphism: Female is unknown.

Differential diagnosis: In the elytral structure *Porrostoma arfakense* Kazantsev sp. nov. is quite unlike other members of the genus (Plate 59 fig. 1). At the same time it resembles *Procautires multipilosus* Kazantsev, 2016, both in the elytral structure and male genitalia (Plate 60 figs 1-3). It is possible that these species form a monophyletic lineage.

Distribution: Known only from the Arfak Mountains in Doberai (Bird's Head) Peninsula of West New Guinea.

Platerotini Kleine, 1929

***Plateros* Bourgeois, 1879**

Plateros Bourgeois, 1879: xix.

Type species: *Eros brasiliensis* Lucas, 1857, subsequent designation by Zaragoza, 1999

Note: The genus *Plateros* Waterhouse, 1879 is one of the most species-rich lycid genera, with almost world-wide distribution. The number of species described in this genus is over 800, with 73 species known in New Guinea (Kazantsev 2015a).

Distribution: All biogeographical regions, except western Palaearctic, Greater Antilles, Madagascar, New Zealand and Melanesia/Polynesia (Kleine 1933).

***Plateros candidus* Kazantsev sp. nov.** (Plate 59 fig. 4)

Holotype ♀ NME: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, Anggi Gigi Lake S env., Uper vill. 2-2,5 km NNE, 1°17'10S, 133°54'18"E, 09.IX.2015, 1900-2480 m, primary mid montane rainforest, leg. D.Telnov.

Derivatio nominis: The name of the new species is derived from the Latin for "shining white", alluding to its coloration.

Measurements: Length 8 mm, width across humeri 1.9 mm.

Description: Black. Elytra, except narrow distal margin, whitish yellow; elytral narrow distal margin gray. Vertex with transverse impression behind antennal prominence. Eyes relatively small, interocular distance ca. 1.2 times greater than eye diameter. Labrum small, transverse, slightly convex anteriorly; epistoma feebly concave. Palps slender; ultimate palpomeres small, elongate, slightly widening distally. Antennal sockets separated by minute lamina. Antennae attaining to elytral two thirds, from antennomere 3 flattened, serrate; antennomere 3 ca. 3.2 times longer than antennomere 2 and 1.2 times shorter than antennomere 4; antennomeres 3-11 with short sub-erect pubescence (Plate 59 fig. 4). Pronotum transverse, ca. 1.6 times as wide as long, trapezoidal, pubescent, bisinuate basally and semi-circularly produced anteriorly, with conspicuous acute posterior and rounded anterior angles. Mesothoracic spiracle small, slightly protruding, not hooded. Scutellum transverse, truncate at apex (Plate 59 fig. 4). Elytra long, ca. 3.5 times longer than wide at humeri, somewhat widening distally, with four equally developed primary costae; interstices with double rows of small subquadrate cells; pubescence dense, short and decumbent (Plate 59 fig. 4). Tibiae and femoris straight, narrow; tarsomeres 3-4 widened, plantar pad on tarsomere 1 occupying ca. its distal half.

Sexual dimorphism: Male is unknown.

Differential diagnosis: *Plateros candidus* Kazantsev sp. nov. may be easily separated from the congeners by the combination of coloration, antennal structure and shape of pronotum (Plate 59 fig. 4).

Distribution: Known only from the Arfak Mountains in Doberai (Bird's Head) Peninsula of West New Guinea.

Mimicry

The net-winged beetles are a well-known group of models for many mimicry complexes in the animal kingdom and are mimicked by representatives of many other coleopterous families, as well as other insect orders (e.g. Carpenter & Ford 1933; Linsley et al. 1961; Kazantsev 2005).

While in most other biogeographical regions there exist only a limited (usually small) number of lycid colour patterns, New Guinea is marked for a









seemingly unlimited variety of such patterns and some of the colour forms that occur here are not reported among net-winged beetles elsewhere, e.g., species with green dorsum (Kazantsev 2015c) or blue or silvery portions of elytra (Kleine 1926; 1935) to name but a few.

A complex with a rather unusual colour pattern was discovered between ca. 1900-2500 meters above sea level in the primary mid-montane rainforest of the Arfak Mountains in Doberai Peninsula, West New Guinea, around Lake Gigi (Plate 61). This complex is well characterized by bicolorous elytra, with black posterior and whitish pale yellow anterior portions; only in *Plateros candidus* Kazantsev sp. nov. just the elytral apices are infuscated (Plate 60 fig. 8). The pronotum is mostly black, with one exception, the orange-testaceous pronotum in *Cladophorus dmitryi* Kazantsev sp. nov. (Plate 60 fig. 2). In addition to the Lycidae represented by seven species from six different genera and two tribes (Plate 60 figs 1-3, 5-8), cantharids and chrysomelids of very similar appearance (Plate 60 figs 9-12) were collected in the very same locality - a transect along the montane ridge. Specimens were sampled from upperside of low-strata foliage (1-1.5 m above the ground). The specimens were sitting motionless or moving slowly and not flying away when disturbed (beaten from leaves and branches). A few specimens were observed saunteringly moving around the same leaf not leaving it when reaching the edge, but rather returning to the central position. The mimicking Cantharidae and Chrysomelidae specimens were found in similar circumstances, some of them sitting on the same young trees together with the lycids. Average day temperatures at collecting spot were +22-24 °C, but much cooler and very wet (misty) at night (about +10 °C).

In this case the Müllerian mimicry complex of the Net-winged beetles is complemented by the Batesian complex formed by the Net-winged beetles and their mimics, the Soldier beetles and the Leaf beetles. Additionally, a similarly coloured Net-winged beetle (Plate 60 fig. 4) was found some 700 km east at approximately the same altitude, at 2000 m above sea level, in the Central Cordillera of New Guinea, East Indonesia.

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New Metriorrhynchine taxa from New Guinea (Coleoptera: Lycidae)

Sergey V. Kazantsev

Insect Centre, Donetskaya Str. 13-326, 109651, Moscow, Russia; e-mail: kazantss@mail.ru

Abstract: Forty six new species of metriorrhynchine net-winged beetles - *Cautires brunneus*, *C. dituaoides*, *C. eniclasoides*, *C. extraneus*, *C. ignotus*, *C. miklukhomaklaii*, *C. picipennis*, *C. tricoloripennis*, *Cladophorus anggiensis*, *C. avicollaris*, *C. bupuensis*, *C. carbonipennis*, *C. flavoscutellatus*, *C. grekeae*, *C. halmaheraensis*, *C. holynskii*, *C. humeralissimus*, *C. lacrimosus*, *C. maurokitrinus*, *C. maurus*, *C. nabirensis*, *C. nimbus*, *C. obiensis*, *C. pusspenssatensis*, *C. telnovi*, *C. tertius*, *C. weigeli*, *Malacolycus gigiensis*, *Metriorrhynchus cochleiformis*, *M. uperensis*, *M. vitiosus*, *Porrostoma cautiromimum*, *P. exile*, *P. fuscum*, *P. gigivagum*, *P. mutum*, *P. mystax*, *P. semiflavum*, *Procautires cirratus*, *P. fuscicolor*, *Pseudodontocerus gigilacus*, *P. hilaris*, *P. incultus*, *P. maculihumeralis*, *P. variicornis* and *P. villosus* spp. nov. - are described from New Guinea and adjacent islands. *Cladophorus fuscatus* Waterhouse, 1879 is transferred to *Pseudodontocerus* as *Pseudodontocerus fuscatus* (Waterhouse, 1879) comb. nov. and *Cladophorus loriae* Kleine, 1926 is transferred to *Porrostoma* as *Porrostoma loriae* (Kleine, 1926) comb. nov. *Cautires maturnus* Kleine, 1926, *Cladophorus formosus* Guerin-Meneville, 1830, the type species of the genus, and *Pseudodontocerus fuscatus* (Waterhouse, 1879) are illustrated.

Key words: Coleoptera, Lycidae, Metriorrhynchini, new species, Papuan region.

Introduction

The Metriorrhynchini are by far the most diverse and species-rich group of net-winged beetles in New Guinea (Kleine 1926, 1933) and account for more than half of the described taxa of the region's lycid fauna.

An opportunity to study the vast Lycidae collections of the Institut Royal des Sciences naturelles de Belgique, Bruxelles, the Erfurt Naturkundemuseum and the Entomological Society of Latvia has already led to publication of several papers on Metriorrhynchini of New Guinea (Kazantsev 2007, 2010, 2015a, 2015b, 2016a, 2016b). In a further contribution to the knowledge of this group another forty six new to science metriorrhynchine species from seven genera, *Cautires* Waterhouse, 1879, *Cladophorus* Guerin-Meneville, 1830, *Malacolycus* Kleine, 1943, *Metriorrhynchus* Gemminger, Harold, 1869, *Porrostoma* Laporte, 1838, *Procautires* Kleine, 1925 and *Pseudodontocerus* Pic, 1921, are described.

Materials and methods

Collecting methods yielding all several thousand net-winged beetles from the Institut Royal de Sciences naturelles de Belgique collection were light traps and canopy fogging. Collecting methods used by Dr. D. Telnov and other members of the Entomological Society of Latvia expedition to New Guinea included beating from lower vegetation and branches, as well as collecting at white light.

The studied specimens were pinned or glued on cardboard or transparent plastic mounting plates. For detailed examination they were relaxed in water; then the detached ultimate abdominal segments were treated for several hours in 10% KOH at room temperature, then the extracted genitalia were placed in a microvial with glycerin and photographed; finally, glued back on mounting plates. Some aedeagi with evaginated and fully membranous inner sac were put in water for photographing, as in glycerin these delicate structures tended to get squeezed.

MSP-1 zoom stereoscopic dissecting microscope with x8 – x80 magnification range was used. Photographs were taken with Canon EOS 6D camera and Canon MP-E 65 mm lens.

Abbreviations used in the text:

DTC – Collection of Dr. D. Telnov, Rīga;
ICM – Insect Center, Moscow, Russia;





ISNB – Institut Royal des Sciences naturelles de Belgique, Bruxelles;
NME – Naturkundemuseum Erfurt, Germany.

Taxonomic part

Cladophorus Guerin-Meneville, 1830

Cladophorus Guerin-Meneville, 1830: plate II, fig. 9.
Type species: *Cladophorus formosus* Guerin-Meneville, 1830, designated by Waterhouse, 1878
= *Odontocerus* Guerin-Meneville, 1830: 72.
Type species: *Cladophorus formosus* Guerin-Meneville, 1830, designated by Bourgeois, 1892.

Notes: Several dozen *Cladophorus* species are known from New Guinea (Kleine 1926; 1933; Bocák 2002). The genus may be distinguished by the flabellae stemming not from the bases, but from the apices of relevant antennomeres, mostly cylindrical and narrowed distally median lobe of their aedeagi with stout leathery phallobasal membrane (Plate 62 figs 1-3).
The genus *Cladophorus* appears to have two principal morphological types, the *formosus* type, i.e. of the type species of the genus, characterized by the elongate bipod inner sac structure of the median lobe of the aedeagus (e.g., Plate 62 figs 2-3, 5-6) and the *carbonipennis* type, with a scissors-like inner sac structure (e.g., Plate 69 figs 8-9). At the same time the scissors-like inner sac structure is not infrequent in New Guinean species attributed to *Cautires* Waterhouse, 1879 (e.g., Plate 76 figs 5-7) and *Pseudodontocerus* Pic, 1921 (e.g., Plate 72 figs 5-6). Apparently, the relationships between *Cladophorus* and related genera, including *Cautires* and *Pseudodontocerus*, need to be reinvestigated on the basis of a comprehensive phylogenetic analysis, preceded by more alpha-taxonomic studies.
Distribution: Papuan and Australian regions.

***Cladophorus avicollaris* sp. nov.** (Plate 62 figs 4-6)
Holotype ♂ NME: E Indonesia, West Papua, S Bird's Neck, 7-9 km NW Kaimana, 03°35'02"S, 133°42'58"E, 25-200 m, primeval rainforest on limestone, 05.IX.2010, leg. D.Telnov.

Derivatio nominis: The name of the new species is derived from the Latin for "bird's neck", with reference to the locality where the unique specimen was collected.
Description: Length 12.2 mm. Width across humeri 2.7 mm.
Dark brown. Scapus proximally, pronotum, except at anterior and posterior margin, trochanters and partly femoris and tibiae testaceous. Head without rostrum. Vertex with deep transverse impression behind antennal prominence. Eyes small, interocular distance ca. 2 times larger than eye diameter. Labrum transverse, truncate anteriorly. Palps slender; ultimate palpomeres elongate, oblique at apex. Antennal sockets separated by narrow lamina. Antennae nearly attaining to elytral apices, from antennomere 3 flabellate; antennomere 3 ca. 16 times longer than antennomere 2 and ca. 1.1 times shorter than antennomere 4; flabellum of antennomere 3 ca. 2.4 times, flabellum of antennomere 4 ca. 2.8 times and flabellum of antennomere 5 ca. 3.3 times longer than relevant antennal stem; antennomeres 3-11 with short decumbent pubescence (Plate 62 fig. 4). Pronotum transverse, ca. 1.4 times as wide as long, trapezoidal, slightly bisinuate basally and feebly convex anteriorly, with conspicuous acute posterior and blunt rounded anterior angles; median cell relatively broad, extending to pronotal 0.8; lateral carinae straight, conspicuous; anterior cells diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle hooded; hood long, narrow, bent backwards. Scutellum subquadrate, slightly narrowing distally, triangularly emarginate at apex (Plate 62 fig. 4). Elytra long, ca. 4.2 times longer than wide at humeri, slightly widening posteriorly, with four equally developed primary costae, except weakened in posterior half primary costa 1; all interstices with double rows of transverse subrectangular cells; bottom of cells hairless; pubescence short and decumbent (Plate 62 fig. 4). Tibiae and femoris straight, narrow; tarsomeres 2-4 widened, with developed plantar pad. Male aedeagus with bottle-shaped median lobe, its constricted distal portion relatively long; inner sac with bipod structure; phallobasal membrane ca. 0.4 length of median lobe (Plate 62 figs 5-6).
Sexual dimorphism: Female is unknown.
Differential diagnosis: *Cladophorus avicollaris* sp. nov. may be differentiated from *C. rufithorax* Bourgeois, 1892, similar in coloration, by the broader pronotum and conspicuously longer antennal flabellae, as well as by the bottle-shaped median lobe of the aedeagus (Plate 62 figs 4-6).
Distribution: Known only from Indonesian New Guinea.

***Cladophorus bupuensis* sp. nov.** (Plate 63 figs 1-3)
Holotype ♂ ICM: Papua New Guinea, Upper Bupu, ca. 15 km N Lae, 1-5 km NE Kwapsanek, 600-1300 m, 30.X.1988, R. Holyński leg.






Paratype ♂ ICM: same label as in holotype.

Derivatio nominis: The name of the new species is derived from the locality where the type series was collected.

Description: Length 11.7-12.6 mm. Width across humeri 2.9-3.1 mm.

Dark brown. Scapus proximally light brown; elytral proximal fourth testaceous. Head without rostrum. Vertex with deep transverse impression behind antennal prominence. Eyes small, interocular distance ca. 1.5 times greater than eye diameter. Labrum transverse, rounded anteriorly. Palps slender; ultimate palpomeres elongate, oblique at apex. Antennal sockets separated by minute lamina. Antennae attaining to elytral three fourths, from antennomere 3 flabellate; antennomere 3 ca. 8 times longer than antennomere 2 and subequal in length to antennomere 4; flabellum of antennomere 3 ca. 3.5 times, flabellum of antennomere 4 ca. 4.7 times and flabellum of antennomere 5 ca. 4.1 times longer than relevant antennal stem; antennomeres 3-11 with relatively short erect pubescence (Plate 63 fig. 1). Pronotum transverse, ca. 1.7 times as wide as long, trapezoidal, slightly bisinuate basally and inconspicuously semi-circularly projected anteriorly, with conspicuous acute laterally projected posterior and rounded anterior angles; median cell moderately broad, reaching anterior margin; lateral carinae straight, conspicuous; anterior cells relatively narrow, slightly diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle hooded; hood long, broad, bent backwards. Scutellum subquadrate, slightly narrowing distally, triangularly emarginate at apex (Plate 63 fig. 1). Elytra long, ca. 3.6 times longer than wide at humeri, slightly widening posteriorly, with four equally developed primary costae; all interstices with double rows of transverse subrectangular cells; bottom of cells hairy; pubescence dense, short and decumbent (Plate 63 fig. 1). Tibiae and femoris straight, narrow; tarsomeres 2-4 widened, with developed plantar pad. Male aedeagus with noticeably convex median lobe, its distal constriction relatively short; inner sac with bipod structure; phallobasal membrane ca. 0.5 length of median lobe (Plate 63 figs 2-3).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Cladophorus bupuensis* sp. nov. seems to be close to *C. flabellifer* Bourgeois, 1892, separable by the shorter proximal testaceous elytral band (extending to elytral half in *C. flabellifer*) and shorter constricted distal tip of the median lobe of the aedeagus (Plate 63 figs 1-3).

Distribution: Known only from Upper Bupu, Papua New Guinea.

***Cladophorus flavoscutellatus* sp. nov.** (Plate 63 figs 4-5)

Holotype ♀ ISNB: Papua New Guinea, Madang prov., Baiteta, light, 1.VII.1996, O. Missa leg.

Derivatio nominis: The name of the new species is derived from the Latin for “with yellow scutellum”, alluding to its coloration.

Description: Length 10.8 mm. Width across humeri 2.4 mm.

Dark brown. Pronotal margins, scutellum, elytra below shoulders and around scutellum in elongate triangle, trochanters and bases of femoris light brown. Head without rostrum. Vertex with prominent transverse impression behind antennal prominence. Eyes small, interocular distance ca. 1.7 times greater than eye diameter. Labrum transverse, rounded at sides, truncate anteriorly. Palps slender; ultimate palpomeres elongate, parallel-sided, oblique at apex. Antennal sockets separated by narrow lamina. Antennae attaining to elytral six sevenths, antennomere 3 dentate; from antennomere 4 flabellate; antennomere 3 ca. 12 times longer than antennomere 2 and 1.1 times longer than antennomere 4; flabellum of antennomere 4 ca. 2 times and flabellum of antennomere 5 ca. 1.5 times shorter than relevant antennal stem; antennomeres 3-11 with short decumbent pubescence (Plate 63 fig. 4). Pronotum transverse, ca. 1.3 times as wide as long, slightly bisinuate basally and moderately convex anteriorly, with concave sides, small conspicuous acute posterior and pronounced blunt anterior angles; median cell broad, reaching anterior margin; lateral carinae developed, but not sharp, concave; anterior cells diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle hooded; hood prominent, bent backwards. Scutellum transverse, slightly narrowing distally, triangularly emarginate at apex (Plate 63 fig. 4). Elytra long, ca. 3.6 times longer than wide at humeri, parallel-sided, with four equally developed primary costae; all interstices with double rows of small transverse in anterior third and subquadrate posteriorly cells; bottom of cells hairless; pubescence dense, short and decumbent (Plate 63 fig. 4). Tibiae and femoris straight, tibiae narrow, femoris relatively broad; tarsomeres 2-4 widened, with plantar pad. Female external genitalia with free, elongate, relatively narrow coxites subequal in length to valvifers; valvifers free, conspicuously convex; styli elongate, robust (Plate 63 fig. 5).





Sexual dimorphism: Male is unknown.
Differential diagnosis: *Cladophorus flavoscutellatus* sp. nov. is readily distinguishable from all congeners by the coloration (Plate 63 fig. 4).
Distribution: Known only from Madang, Papua New Guinea.

***Cladophorus grekeae* sp. nov.** (Plate 64 figs 1-3)
Holotype ♂ NME: E Indonesia, Raja Ampat Prov., SW Misool, Misool Utara distr., ca. 2-5 km NNW Aduwey (Adua) vill., Hakau River valley, 01°58'56"S, 129°54'37"E, primeval rainforest near valley, beaten from branches, 25.III.2009, leg. D.Telnov & K.Greke.

Derivatio nominis: Patronymic. The new species is named after one of the collectors of the unique type specimen, Ms. Kristina Greke (Rīga, Latvia).
Description: Length 14.5 mm. Width across humeri 2.9 mm.
Dark brown. Scapus proximally and pedicel light brown; elytral proximal third testaceous. Head without rostrum. Vertex with transverse groove and two deep round impressions behind antennal prominence. Eyes small, interocular distance ca. 2 times greater than eye diameter. Labrum transverse, feebly emarginate anteriorly. Palps slender; ultimate palpomeres stout, elongate, oblique at apex. Antennal sockets separated by narrow lamina. Antennae attaining to elytral two thirds, from antennomere 3 flabellate; antennomere 3 ca. 8 times longer than antennomere 2 and 1.25 times shorter than antennomere 4; flabellum of antennomere 3 ca. 3.3 times, flabellum of antennomere 4 ca. 3.6 times and flabellum of antennomere 5 ca. 3.7 times longer than relevant antennal stem; antennomeres 3-11 with short erect pubescence (Plate 64 fig. 1). Pronotum transverse, ca. 1.4 times as wide as long, trapezoidal, slightly bisinuate basally and feebly arcuate anteriorly, with convex sides, inconspicuous acute posterior and rounded anterior angles; median cell broad in the middle, extending to pronotal 0.7; lateral carinae straight, conspicuous; anterior cells not diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle hooded; hood long, bent backwards. Scutellum elongate, narrowing distally, triangularly emarginate at apex (Plate 64 fig. 1). Elytra long, ca. 3.9 times longer than wide at humeri, parallel-sided, with four equally developed primary costae; all interstices with double rows of transverse subrectangular cells; bottom of cells hairless; pubescence dense, short and decumbent (Plate 64 fig. 1). Tibiae and femoris straight, narrow; tarsomeres 2-4 widened, with plantar pad. Male aedeagus with straight cylindrical median lobe, its distal constriction short; inner sac with bipod structure; phallobasal membrane ca. 0.5 length of median lobe (Plate 64 figs 2-3).
Sexual dimorphism: Female is unknown.
Differential diagnosis: *Cladophorus grekeae* sp. nov. seems to be quite close to *C. bupuensis* sp. nov. (see description of this species above), but is separable by the smaller eyes, somewhat longer proximal testaceous elytral part, as well as by the straight median lobe of the aedeagus with shorter distal constriction (Plate 64 figs 1-3).
Distribution: Known only from Misool.

***Cladophorus holynskii* sp. nov.** (Plate 64 figs 4-6)
Holotype ♂ ICM: Papua New Guinea, Upper Bupu, ca. 15 km N Lae, 1-5 km NE Kwapsanek, 600-1300 m, 30.X.1988, R. Holyński leg.

Derivatio nominis: Patronymic. The new species is named after the collector of the unique type specimen, Dr. Roman Holyński (Milanowek, Poland).
Description: Length 12.3 mm. Width across humeri 2.8 mm.
Dark brown. Scapus proximally and pedicel light brown; pronotum, scutellum, elytra, except at distal fifth, trochanters and bases of femoris testaceous. Head without rostrum. Vertex with transverse groove and two small deep round impressions behind antennal prominence. Eyes small, interocular distance ca. 1.6 times greater than eye diameter. Labrum transverse, semi-rectangular, truncate anteriorly. Palps slender; ultimate palpomeres elongate, widened and oblique interiorly. Antennal sockets separated by narrow lamina. Antennae attaining to elytral three fourths, from antennomere 3 flabellate; antennomere 3 ca. 9 times longer than antennomere 2 and 1.1 times longer than antennomere 4; flabellum of antennomere 3 ca. 5.7 times, flabellum of antennomere 4 ca. 6.8 times and flabellum of antennomere 5 ca. 6.5 times longer than relevant antennal stem; antennomeres 3-11 with short erect pubescence (Plate 64 fig. 4). Pronotum transverse, ca. 1.5 times as wide as long, trapezoidal, slightly bisinuate basally and noticeably semicircularly projected anteriorly, with slightly convex sides, conspicuous acute posterior and conspicuous acute anterior angles; median cell moderately broad, extending to pronotal 0.75; lateral carinae conspicuous, slightly concave; anterior cells diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle hooded; hood long, narrow, bent backwards. Scutellum subquadrate, narrowing distally, triangularly emarginate at apex (Plate 64 fig. 4). Elytra long, ca. 3.5 times longer






than wide at humeri, slightly widening posteriorly, with four equally developed primary costae; interstices 1 and 5 with double rows of irregular subquadrate cells; all interstices with double rows of transverse subrectagular cells; bottom of cells hairless; pubescence dense, short and decumbent (Plate 64 fig. 4). Tibiae and femoris straight, narrow; tarsomeres 2-4 widened, with plantar pad. Male aedeagus with somewhat widened distally and noticeably convex median lobe, its distal constriction relatively short; inner sac with bipod structure; phallobasal membrane long, over 0.5 length of median lobe (Plate 64 figs 5-6).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Cladophorus holynskii* sp. nov., resembling *C. ceramensis* Kleine, 1926 from Central Moluccas, Seram Island (which is apparently not a *Cladophorus*, but a *Metriorrhynchus* Gemminger, Harold, 1869 species) in coloration, is easily separable by the very long antennal flabellae and a completely different type of the aedeagus (Plate 64 figs 4-6). It may also be distinguished from other *Cladophorus* species by the strongly trapezoidal pronotum with acute anterior angles.

Distribution: Known only from Upper Bupu, Papua New Guinea.

***Cladophorus humeralissimus* sp. nov.** (Plate 65 figs 1-5)

Holotype ♂ ICM: Papua New Guinea, 17 km SSW Madang, 4 km W Maranga Hook, 7.III.1989, M. & R. Holyński leg.

Paratypes: 8♂ & 6♀ ICM & ISNB: Papua New Guinea, Madang prov., Baiteta, light, O. Missa leg., dates: 9.IV.1996; 10.IV.1993; 9.IV.1996; 13.IV.1996 (2 specimens); 1.V.1996; 15.V.1996 (2 specimens); 16.V.1996; 20.V.1996; 23.V.1996; 20.VI.1996; 25.VI.1996; 15.VII.1996; 1♂ & 1♀ ISNB: Papua New Guinea, Madang prov., Baiteta, fogging, O. Missa leg., dates: 10.V.1995 (♀); 4.VII.1995 (♂).

Derivatio nominis: The name of the new species is derived from the Latin for “shoulder”, alluding to its elytral coloration.

Description: Length 6.3-9.6 mm. Width across humeri 1.5-2.5 mm.

Dark brown. Pronotal margins narrowly light brown; trochanters, elytral humeri and tibiae distally testaceous. Head without rostrum. Vertex with deep triangular impression behind antennal prominence. Eyes relatively large, interocular distance ca. 1.2 times greater than eye diameter. Labrum transverse, slightly emarginate anteriorly. Palps slender; ultimate palpomeres narrow, elongate, pointed and glabrous at apex. Antennal sockets separated by minute lamina. Antennae attaining to elytral five sixths, from antennomere 3 flabellate; antennomere 3 ca. 8 times longer than antennomere 2 and 1.4 times longer than antennomere 4; flabellum of antennomere 3 ca. 2 times, flabellum of antennomere 4 ca. 5 times and flabellum of antennomere 5 ca. 5.3 times longer than relevant antennal stem; antennomeres 3-11 with short decumbent pubescence (Plate 65 fig. 1). Pronotum transverse, ca. 1.7 times as wide as long, semi-circular anteriorly, with parallel sides, conspicuous small acute posterior and rounded anterior angles; median cell broad, extending to pronotal 0.75; lateral carinae conspicuous, straight; anterior cells short, slightly diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle small, hooded; hood very small and narrow, bent backwards. Scutellum subquadrate, slightly narrowing distally, triangularly emarginate at apex (Plate 65 fig. 1). Elytra long, ca. 3.4 times longer than wide at humeri, parallel-sided, with four equally developed primary costae, except primary costa 1 weakening in distal fourth; interstices 1 and 5 with double rows of irregular subquadrate cells; all interstices with double rows of transverse subrectangular cells; bottom of cells hairless; pubescence scarce, short and semierect (Plate 65 fig. 1). Tibiae and femoris straight, narrow; tarsomeres 2-4 widened, with plantar pad (tarsomeres 1 and 2 with minute apical plantar pad). Male aedeagus with relatively broad, noticeably convex, constricted both proximally and distally median lobe; inner sac with scissors-like structure; phallobasal membrane large, leathery, constituting over 0.6 length of median lobe (Plate 65 figs 2-3).

Sexual dimorphism: Female similar to male, but eyes smaller, antennal flabellae shorter, femoris broader (Plate 65 fig. 4). External genitalia with free, elongate, robust coxites; valvifers free, narrow, sinuous, 2.25 times longer than coxites; styli elongate, robust (Plate 65 fig. 5).

Differential diagnosis: *Cladophorus humeralissimus* sp. nov., somewhat resembling *C. brunnescens* Kleine, 1926 in coloration, is easily separable by the less conspicuous testaceous pronotal margin and completely different structure of the aedeagus (Plate 65 figs 1-3); the new species is also distinguishable from most of the congeners by the pointed ultimate palpomeres and very small hood of the mesothoracic spiracle, its long sinuous valvifers (Plate 65 fig. 5) unlike those of any other member of the genus where these structures have been studied.

Distribution: Known only from Madang, Papua New Guinea.






***Cladophorus lacrimosus* sp. nov.** (Plate 65 figs 6-9)
Holotype ♂ NME: E Indonesia, West New Guinea, Doberai Peninsula, 15.5-14 km N Ayamaru, 01°08'04"S, 132°11'30"E, 275-250 m, primary lowland rainforest on limestone, 2.IX.2015, leg. D.Telnov.

Derivatio nominis: The name of the new species is derived from the Latin for "mournful", alluding to its coloration.
Description: Length 12.2 mm. Width across humeri 2.6 mm.
Dark brown to black. Antennomere 2 and pronotum, except at disk, reddish brown. Head without rostrum. Vertex with prominent transverse impression behind antennal prominence. Eyes small, interocular distance ca. 2 times greater than eye diameter. Labrum small, transverse, concave anteriorly. Palps short; ultimate palpomeres robust, widened and flattened at apex. Antennal sockets separated by minute lamina. Antennae nearly attaining to elytral apices, from antennomere 3 flabellate; antennomere 3 ca. 10 times longer than antennomere 2 and subequal in length to antennomere 4; flabellum of antennomere 3 ca. 1.4 times, flabellae of antennomeres 4 and 5 ca. 1.75 times longer than relevant antennal stem; antennomeres 3-11 with short erect pubescence (Plate 65 fig. 6). Pronotum moderately transverse, ca. 1.3 times as wide as long, convex anteriorly, with nearly parallel sides, conspicuous acute posterior and evident blunt anterior angles; median cell relatively narrow, almost attaining anterior margin; lateral carinae inconspicuous, curved; anterior cells somewhat rounded anteriorly, formed by curved antero-lateral carinae, inconspicuous near anterior margin. Mesothoracic spiracle small, hooded; hood long and narrow, bent backwards. Scutellum transverse, slightly narrowing distally, triangularly emarginate at apex (Plate 65 fig. 6). Elytra long, ca. 3.75 times longer than wide at humeri, slightly widening posteriorly, with four equally developed primary costae, except primary costa 1 weakening in distal third; interstices with double rows of small regular subquadrate cells; bottom of cells hairless; pubescence scarce, short and semi-erect (Plate 65 fig. 6). Tibiae and femoris straight and narrow; tarsomeres 2-4 widened, tarsomeres 1-4 with developed plantar pad. Male penultimate tergite bipartite, deeply incised, divided by median suture; ultimate sternite proximally broad, dilated and convex at base (Plate 65 fig. 7). Aedeagus with relatively narrow, straight, convex in lateral view, constricted both proximally and distally median lobe; inner sac with convex in lateral view sclerotized elongate structure, its bipod base short; phallobasal membrane small, leathery, constituting ca. 0.25 length of median lobe (Plate 65 figs 8-9).
Sexual dimorphism: Female is unknown.
Differential diagnosis: *Cladophorus lacrimosus* sp. nov. may be placed near *C. avicollaris* sp. nov., separable by the noticeably shorter male antennal flabellae, shorter apical constriction of the median lobe of the aedeagus, shorter bipod base of the inner sac sclerotized structure and conspicuously shorter phallobasal membrane (Plate 65 figs 6-9). It may be distinguished from the also similarly coloured *C. rufithorax* by the different type of the aedeagal structure.
Distribution: Known only from Doberai Peninsula, Indonesian New Guinea.

***Cladophorus maurokitrinus* sp. nov.** (Plate 66 figs 1-3)
Holotype ♂ ICM: E Papua New Guinea, Morose Pr., Wau: Ecol. Inst., at light, 1-2.XII.1988, R. Holyński leg.

Derivatio nominis: The name of the new species is derived from the Greek for "black" and "yellow", alluding to its coloration.
Description: Length 11.8 mm. Width across humeri 2.3 mm.
Dark brown to black. Metaventrite, elytral suture at penultimate fourth, abdominal ventrites 1-4, metacoxae, metatrochanters and bases of hind femoris bright orange testaceous. Head without rostrum. Vertex with two small deep oblique impressions behind antennal prominence. Eyes relatively large, interocular distance ca. 1.4 times greater than eye diameter. Labrum transverse, rounded. Palps slender; ultimate palpomeres small, narrow, pointed and glabrous at apex. Antennal sockets separated by narrow lamina. Antennae attaining to elytral four fifths, from antennomere 3 flabellate; antennomere 3 ca. 8 times longer than antennomere 2 and 1.5 times longer than antennomere 4; flabellum of antennomere 3 ca. 2.2 times, flabellum of antennomere 4 ca. 5.5 times and flabellum of antennomere 5 ca. 5.9 times longer than relevant antennal stem; antennomeres 3-11 with very short decumbent pubescence (Plate 66 fig. 1). Pronotum transverse, ca. 1.4 times as wide as long, triangular, bisinuate basally and rounded anteriorly, with conspicuous acute posterior angles; median cell relatively broad anteriorly, extending to pronotal 0.8; lateral carinae conspicuous, long, convex; anterior cells subquadrate, formed by convex antero-lateral carinae. Mesothoracic spiracle small, not hooded. Scutellum subquadrate, slightly narrowing distally, semi-cir-






cularly emarginate at apex (Plate 66 fig. 1). Elytra long, narrow, ca. 5.2 times longer than wide at humeri, widening posteriorly and dehiscent in posterior two thirds, with four equally developed primary costae; all interstices with double rows of small regular transverse cells; bottom of cells hairless; pubescence scarce, short and semi-erect (Plate 66 fig. 1). Tibiae and femoris straight, narrow; tarsomeres 2-4 widened, with plantar pad. Male aedeagus with moderately broad, straight, constricted both proximally and distally median lobe; inner sac with scissors-like structure; phallobasal membrane over 0.5 length of median lobe (Plate 66 figs 2-3).
Sexual dimorphism: Female is unknown.
Differential diagnosis: *Cladophorus maurokitrinus* sp. nov. is readily differentiated from all congeners by the uniformly black upperside with bright yellow underside, relatively small pronotum, dehiscent elytra, unhooded mesothoracic spiracle and details of the aedeagus (Plate 66 figs 1-3).
Distribution: Known only from Wau, Papua New Guinea.

***Cladophorus maurus* sp. nov.** (Plate 66 figs 4-6)
Holotype ♂ NME: E Indonesia, Irian Jaya, 170 km S Nabire, Epomani, 1150 m, 6.I.1998, A. Weigel leg.

Derivatio nominis: The name of the new species is derived from the Greek for "black", alluding to its coloration.
Description: Length 12.5 mm. Width across humeri 3 mm.
Uniformly dark brown to black. Head without rostrum. Vertex with deep transverse impression behind antennal prominence. Eyes small, interocular distance ca. 2.1 times greater than eye diameter. Labrum transverse, truncate anteriorly. Palps slender; ultimate palpomeres small, elongate, parallel-sided and oblique at apex. Antennal sockets separated by narrow lamina. Antennae attaining to elytral four fifths, from antennomere 3 flabellate; antennomere 3 ca. 6 times longer than antennomere 2 and 1.1 times shorter than antennomere 4; flabellum of antennomere 3 ca. 2.25 times, flabellum of antennomere 4 and 5 ca. 2.5 times longer than relevant antennal stem; antennomeres 3-11 with short sub-erect pubescence (Plate 66 fig. 4). Pronotum transverse, ca. 1.4 times as wide as long, slightly trapezoidal, almost straight basally and semi-circular anteriorly, with conspicuous right posterior and rounded anterior angles; median cell relatively narrow, reaching anterior margin; lateral carinae inconspicuous, near median cell obliterate; anterior cells diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle hooded; hood prominent, bent backwards. Scutellum subquadrate, slightly narrowing distally, triangularly emarginate at apex (Plate 66 fig. 4). Elytra long, ca. 3.5 times longer than wide at humeri, widening posteriorly, with four equally developed primary costae; all interstices with double rows of transverse subrectangular cells; bottom of cells hairless; pubescence scarce, very short and decumbent (Plate 66 fig. 4). Tibiae and femoris straight, tibiae narrow, femoris relatively broad; tarsomeres 2-4 widened, with plantar pad. Male aedeagus with somewhat convex median lobe, its distal constriction long; inner sac with bipod structure; phallobasal membrane over 0.5 length of median lobe (Plate 66 figs 5-6).
Sexual dimorphism: Female is unknown.
Differential diagnosis: *Cladophorus maurus* sp. nov., resembling *C. belzebuth* Bourgeois, 1892 in coloration and pronotal structure, is readily separable by the right posterior pronotal angles, and long antennal flabellae, as well as by the slightly convex median lobe of the aedeagus with long distal constriction (Plate 66 figs 4-6).
Distribution: Known only from Nabire area, Indonesian New Guinea.

***Cladophorus nabirensis* sp. nov.** (Plate 67 figs 1-3)
Holotype ♂ ICM: E Indonesia, Irian Jaya, Nabire area, 750 m, 28.V.1995, V. Tuzov leg.
Paratypes 5♂ ICM & NME: E Indonesia, Irian Jaya, 50 km S Nabire, Ilaga road, Pusppenssat Station, 03°29.5'S, 135°43.8.'E, 300 m, VIII-IX.1991, O. Heyes leg. (2 specimens); E Indonesia, Irian Jaya, 50 km S Nabire, Pusppenssat, 29.XII.1996, A. Weigel leg.; E Indonesia, Irian Jaya, 50 km S Nabire, Pusppenssat, 03°29'53"S, 135°43'83"E, 730 m, 20.II.1998, A. Weigel leg.; E Indonesia, Irian Jaya, Nabire area, road Nabire-Ilaga, km 54, 03°29'51"S, 135°43'913"E, 750 m, IV.1998, M. Balke leg.

Derivatio nominis: The name of the new species is derived from the locality where the type series was collected.
Description: Length 14.5-16.2 mm. Width across humeri 3.5-4.0 mm.
Black. Pronotum and elytra, except on elongate triangular patch around scutellum and at apices, bright testaceous. Head without rostrum. Vertex with deep transverse impression behind antennal prominence. Eyes small, interocular distance ca. 2 times greater than eye diameter. Labrum transverse, slightly emarginate anteriorly. Palps slender; ultimate palpomeres elongate, robust, oblique interiorly. Antennal sockets separated by narrow





lamina. Antennae attaining to elytral five sixths, from antennomere 3 flabellate; antennomere 3 ca. 8 times longer than antennomere 2 and subequal in length to antennomere 4; flabellum of antennomere 3 ca. 3.1 times, flabellum of antennomere 4 ca. 3.5 times and flabellum of antennomere 5 ca. 3.7 times longer than relevant antennal stem; antennomeres 3-11 with short decumbent pubescence, with separate short erect bristles (Plate 67 fig. 1). Pronotum transverse, ca. 1.5 times as wide as long, trapezoidal, bisinuate basally and slightly projected anteriorly in the middle, with acute posterior and rounded anterior angles; median cell narrow, extending to pronotal 0.8; lateral carinae developed, slightly concave; anterior cells not diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle hooded; hood prominent, bent backwards. Scutellum subquadrate, slightly narrowing distally, triangularly emarginate at apex (Plate 67 fig. 1). Elytra long, ca. 3.3 times longer than wide at humeri, widening posteriorly, with four equally developed primary costae; all interstices with double rows of transverse rectangular cells; bottom of cells hairless; pubescence dense, short and decumbent (Plate 67 fig. 1). Tibiae relatively broad, femoris somewhat curved, widening distally; tarsomeres 2-4 widened, with plantar pad. Male aedeagus with straight bullet-shaped median lobe, its distal constriction short; inner sac with bipod structure; phallobasal membrane ca. 0.45 length of median lobe (Plate 67 figs 2-3).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Cladophorus nabirensis* sp. nov. is readily differentiated from all congeners by the coloration with infuscated around scutellum, along suture and at the apices elytra, as well as by the straight bullet-shaped median lobe of the aedeagus with short distal constriction (Plate 67 figs 1-3).

Distribution: Known only from Nabire area, Indonesian New Guinea.

***Cladophorus nimbus* sp. nov.** (Plate 67 figs 4-6)

Holotype ♂ ICM: Papua New Guinea, Kiriwina Is., VIII.1980, R. Zlotin leg.

Derivatio nominis: The name of the new species is derived from the Latin for “black cloud”, alluding to its coloration.

Description: Length 12.0 mm. Width across humeri 2.9 mm.

Black. Pronotum and elytra, except distally around scutellum, bright yellow. Head without rostrum. Vertex with pair of small round impressions behind antennal prominence. Eyes small, interocular distance ca. 1.6 times greater than eye diameter. Labrum transverse, almost truncate anteriorly; epistoma concave. Palps slender; ultimate palpomeres widening and obliquely truncate distally. Antennal sockets separated by narrow lamina. Antennae attaining to elytral five sixths, from antennomere 3 flabellate; antennomere 3 ca. 8 times longer than antennomere 2 and ca. 1.2 times longer than antennomere 4; flabellum of antennomere 3 ca. 2.7 times, flabellum of antennomere 4 ca. 3.7 times and flabellum of antennomere 5 ca. 4 times longer than relevant antennal stem; antennomeres 3-11 with relatively long erect pubescence (Plate 67 fig. 4). Pronotum transverse, ca. 1.6 times as wide as long, trapezoidal, conspicuously narrowed anteriorly, almost straight basally and projected anteriorly in the middle, with acute posterior and rounded anterior angles; median cell narrow, attaining anterior margin; lateral carinae developed, concave; anterior cells diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle hooded; hood prominent, narrow, long, bent down. Scutellum elongate, narrowing distally, deeply emarginate at apex (Plate 67 fig. 4). Elytra long, ca. 3.4 times longer than wide at humeri, widening posteriorly, with four equally developed primary costae; all interstices with double rows of transverse rectangular cells; bottom of cells hairy; pubescence dense, short and decumbent (Plate 67 fig. 4). Tibiae and femoris straight, relatively broad; tarsomeres 2-4 widened, plantar pad on tarsomeres 1-4, in tarsomere 1 occupying more than half its length. Male aedeagus with straight bullet-shaped median lobe, its distal constriction long and slightly bent outwards; inner sac with bipod structure; phallobasal membrane ca. 0.4 length of median lobe (Plate 67 figs 5-6).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Cladophorus nimbus* sp. nov. is readily differentiated from C. *nabirensis* sp. nov. of somewhat similar coloration by the broader and more narrowed anteriorly pronotum, as well as by the longer and bent outwards distal constriction of the median lobe of the aedeagus (Plate 67 figs 4-6).

Distribution: Known only from Kiriwina Island.

***Cladophorus telnovi* sp. nov.** (Plate 68 figs 1-3)

Holotype ♂ NME: E Indonesia, West Papua, Fak-Fak peninsula, 12-13 km N Fak-Fak, 02°50’06”S, 132°18’22”E, 880-920 m, primeval mossy mountain rainforest on limestone, 24.IX.2010, leg. D.Telnov

Paratypes 2♂ ICM & DTC: same label as in holotype.









Derivatio nominis: The new species is named after the collector of its type series, Dr. Dmitry Telnov (The Entomological Society of Latvia, Rīga).
Description: Length 11.5-15.8 mm. Width across humeri 2.5-3.5 mm.
Dark brown. Pedicel and elytral humeri broadly testaceous. Head without rostrum. Vertex with deep transverse impression behind antennal prominence. Eyes very small, interocular distance ca. 2.3 times greater than eye diameter. Labrum transverse, medially emarginate anteriorly. Palps slender; ultimate palpomeres elongate, flattened and oblique at apex. Antennal sockets separated by minute lamina. Antennae attaining to elytral five sixths, from antennomere 3 flabellate; antennomere 3 ca. 9 times longer than antennomere 2 and 1.1 times shorter than antennomere 4; flabellum of antennomere 3 ca. 6.5 times, flabellum of antennomere 4 and 5 ca. 7.3 times longer than relevant antennal stem; antennomeres 3-11 with short erect pubescence (Plate 68 fig. 1). Pronotum transverse, ca. 1.4 times as wide as long, trapezoidal, concave posteriorly and conspicuously semi-circularly projected anteriorly, with inconspicuous acute posterior and broadly rounded anterior angles; median cell moderately broad, reaching anterior margin; lateral carinae conspicuous, almost straight; anterior cells slightly diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle hooded; hood long, bent backwards. Scutellum elongate, narrowing distally, slightly emarginate at apex (Plate 68 fig. 1). Elytra long, ca. 3.9 times longer than wide at humeri, parallel-sided, with four equally developed primary costae; all interstices with double rows of transverse rectangular cells; bottom of cells hairless; pubescence dense, short and decumbent (Plate 68 fig. 1). Tibiae and femoris straight, moderately broad; tarsomeres 2-4 widened, with developed plantar pad. Male aedeagus with relatively narrow, slightly widening distally median lobe, its distal constriction relatively long; inner sac with bipod structure; phallobasal membrane ca. 0.5 length of median lobe (Plate 68 figs 2-3).
Sexual dimorphism: Female is unknown.
Differential diagnosis: *Cladophorus telnovi* sp. nov., somewhat resembling *C. scapularis* Kleine, 1926 in coloration, is separable by the broader testaceous patches on elytral humeri and distinctly more narrow median lobe of the aedeagus (Plate 68 figs 1-3). The species is also separable from the congeners by the relatively very small eyes.
Distribution: Known only from Onin Peninsula in Indonesian New Guinea.

***Cladophorus weigeli* sp. nov.** (Plate 68 figs 4-6)
Holotype ♂ NME: [E Indonesia], Irian Jaya, Biak, 10 km N Bosnik, 01°05'S, 136°20'E, UWP, 13.II.1998, A. Weigel leg.

Derivatio nominis: The new species is named after the collector of its type specimen.
Description: Length 6.0 mm. Width across humeri 1.3 mm.
Dark brown to black. Pronotum, except at bottom cells anteriorly and posteriorly, reddish testaceous. Head without rostrum. Vertex with deep transverse impression behind antennal prominence. Eyes small, interocular distance ca. 2 times greater than eye diameter. Labrum small, transverse, convex anteriorly. Palps slender; ultimate palpomeres small, elongate, pointed and glabrous at apex. Antennal sockets separated by minute lamina. Antennae attaining to elytral five sixths, from antennomere 3 flabellate; antennomere 3 ca. 6 times longer than antennomere 2 and 1.2 times shorter than antennomere 4; flabellum of antennomere 3 ca. 2.3 times, flabellum of antennomere 4 ca. 3 times and flabellum of antennomere 5 ca. 3.4 times longer than relevant antennal stem; antennomeres 3-11 with short sub-erect pubescence (Plate 68 fig. 4). Pronotum transverse, ca. 1.3 times as wide as long, trapezoidal, almost straight basally and slightly projected anteriorly, with conspicuous acute posterior and evident blunt anterior angles; median cell moderately broad, extending to pronotal 0.7; lateral carinae conspicuous, straight; anterior cells diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle hooded; hood small, narrow, bent backwards. Scutellum transverse, slightly narrowing distally, noticeably triangularly emarginate at apex (Plate 68 fig. 4). Elytra long, ca. 4.1 times longer than wide at humeri, narrowing posteriorly, with four equally developed primary costae; all interstices with double rows of subrectangular, mostly elongate cells; bottom of cells hairless; pubescence dense, short and semi-erect (Plate 68 fig. 4). Tibiae and femoris straight, relatively broad; tarsomeres 3-4 widened, with developed plantar pad (tarsomeres 1 and 2 with minute apical plantar pad). Male aedeagus with conspicuously convex and gradually narrowed distally median lobe; inner sac with scissors-like structure; phallobasal membrane short (Plate 68 figs 5-6).
Sexual dimorphism: Female is unknown.
Differential diagnosis: *Cladophorus weigeli* sp. nov. may be easily differentiated from the somewhat similarly coloured *C. avicollaris* sp. nov. by the conspicuously shorter antennal flabellae, roundish






cells of elytral reticulation, broader legs and conspicuously convex and gradually narrowed distally median lobe of the aedeagus with short phallobasal membrane (Plate 68 figs 4-6).
Distribution: Known only from Biak Island, Cenederawasih Bay, Indonesian New Guinea.

***Cladophorus halmaheraensis* sp. nov.** (Plate 69 figs 1-3)
Holotype ♂ ICM: [E Indonesia], N Moluccas, Halmahera, Talagaranu Mt., 15, SE Baru, 600 m, primeval forest, 22-23.I.1996, Siniaev & Tarasov leg.

Derivatio nominis: The name of the new species is derived from the island where the unique specimen was collected.
Description: Length 8.0 mm. Width across humeri 2.0 mm.
Black. Pronotal carinae and margins, elytra at proximal third, except around scutellum, and proximal fourth of hind femoris testaceous. Head without rostrum. Vertex with fine transverse semi-circular impression behind antennal prominence. Eyes relatively large, interocular distance ca. 1.2 times greater than eye diameter. Labrum transverse, truncate anteriorly. Palps slender; ultimate palpomeres small, narrow, flattened and glabrous at apex. Antennal sockets separated by minute lamina. Antennae attaining to elytral two thirds, from antennomere 3 flabellate; antennomere 3 ca. 9 times longer than antennomere 2 and ca. 1.3 times longer than antennomere 4; flabellum of antennomere 3 ca. 1.5 times shorter than stem, flabellum of antennomere 4 ca. 4.3 times and flabellum of antennomere 5 ca. 4.8 times longer than relevant antennal stem; antennomeres 3-11 with short suberect pubescence (Plate 69 fig. 1). Pronotum transverse, ca. 1.4 times as wide as long, trapezoidal, slightly bisinuate basally and semi-circular anteriorly, with inconspicuous acute posterior and rounded anterior angles; median cell moderately broad, extending to pronotal 0.8; lateral carinae conspicuous, slightly concave; anterior cells broad, diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle small, hooded; hood minute, erect. Scutellum transverse, slightly narrowing distally, semi-circularly emarginate at apex (Plate 69 fig. 1). Elytra long, ca. 3.5 times longer than wide at humeri, parallel-sided, with four equally developed primary costae; all interstices with double rows of regular subquadrate cells; bottom of cells hairless; pubescence dense, short and decumbent (Plate 69 fig. 1). Tibiae and femoris straight, relatively broad; tarsomeres 3-4 widened, tarsomeres 1-4 with plantar pad. Male aedeagus with straight gradually narrowed distally and concave in the middle median lobe; inner sac with scissors-like structure; phallobasal membrane very short (Plate 69 figs 2-3).
Sexual dimorphism: Female is unknown.
Differential diagnosis: *Cladophorus halmaheraensis* sp. nov. may be distinguished from the similarly coloured *C. mancus* Kleine, 1926 by the longer flabellae of antennomeres 4-5 (Plate 69 fig. 1). The new species may also be easily differentiated from all congeners, except *C. obiensis* sp. nov., by the conspicuously narrowed distally and concave in the middle median lobe of the aedeagus, with very short phallobasal membrane (Plate 69 figs 2-3).
Distribution: Known only from Halmahera, North Moluccas.

***Cladophorus obiensis* sp. nov.** (Plate 69 figs 4-6)
Holotype ♂ NME: E Indonesia, North Moluccas, Obi Islands, S Obira Is., Wayaloar vill., ridge W of Wayaloar River, 1°42'42"S, 127°37'01"E, primary lowland forest, 17.XII.2013, leg. L.Wagner.

Derivatio nominis: The name of the new species is derived from the island where the unique specimen was collected.
Description: Length 8.1 mm. Width across humeri 1.8 mm.
Orange testaceous. Head, antennae, distal elytral third, tarsi and distal fourths of tibiae and femoris black. Head without rostrum. Vertex with fine transverse semi-circular impression behind antennal prominence. Eyes relatively large, interocular distance ca. 1.2 times greater than eye diameter. Labrum transverse, truncate anteriorly. Palps slender; ultimate palpomeres small, narrow, flattened and glabrous at apex. Antennal sockets separated by minute lamina. Antennae attaining to elytral three fifths, from antennomere 3 flabellate; antennomere 3 ca. 9 times longer than antennomere 2 and ca. 1.1 times longer than antennomere 4; flabellum of antennomere 3 ca. 1.1 times shorter than stem, flabellum of antennomere 4 ca. 3.3 times and flabellum of antennomere 5 ca. 4.4 times longer than relevant antennal stem; antennomeres 3-11 with short sub-erect pubescence (Plate 69 fig. 4). Pronotum transverse, ca. 1.45 times as wide as long, trapezoidal, almost straight basally and semi-circular anteriorly, with laterally projected acute posterior and rounded anterior angles; median cell moderately broad, extending to pronotal 0.7; lateral carinae conspicuous, concave; anterior cells broad, diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle small,






hooded; hood minute, erect. Scutellum subquadrate, almost parallel-sided, triangularly emarginate at apex (Plate 69 fig. 4). Elytra long, ca. 3.9 times longer than wide at humeri, parallel-sided, slightly narrowing distally, with four equally developed primary costae; all interstices with double rows of regular subquadrate cells; bottom of cells hairless; pubescence dense, short and decumbent (Plate 69 fig. 4). Tibiae and femoris straight, narrow; tarsomeres 3-4 widened, tarsomeres 1-4 with plantar pad. Male aedeagus with straight gradually narrowed distally and concave in the middle median lobe; inner sac with scissors-like structure; phallobasal membrane very short (Plate 69 figs 5-6).
Sexual dimorphism: Female is unknown.
Differential diagnosis: *Cladophorus obiensis* sp. nov. may be differentiated from the very similar *C. halmaheraensis* sp. nov. by the more narrow body, orange testaceous pronotum and shorter black distal elytral portion, shorter flabellum of antennomere 3 and slightly more narrow femurs and tibiae (Plate 69 fig. 4).
Distribution: Known only from Obi Islands, North Moluccas.

***Cladophorus carbonipennis* sp. nov.** (Plate 69 figs 7-9)
Holotype ♂ ICM: E Indonesia, Irian Jaya, Nabire area, 750 m, 28.V.1995, V. Tuzov leg.

Derivatio nominis: The name of the new species is derived from the Latin for "charcoal", alluding to its coloration.
Description: Length 9.0 mm. Width across humeri 2.0 mm.
Dark brown to black. Trochanters and bases of femoris testaceous. Head without rostrum. Vertex with fine transverse semi-circular impression behind antennal prominence. Eyes relatively large, interocular distance ca. 1.1 times greater than eye diameter. Labrum transverse, triangular and rounded anteriorly. Palps slender; ultimate palpomeres small, elongate, narrowed, flattened and glabrous at apex. Antennal sockets separated by minute lamina. Antennae attaining to elytral three fifths, from antennomere 3 flabellate; antennomere 3 ca. 8 times longer than antennomere 2 and ca. 1.3 times longer than antennomere 4; flabellum of antennomere 3 ca. 1.5 times shorter than stem, flabellum of antennomere 4 ca. 2.7 times and flabellum of antennomere 5 ca. 7 times longer than relevant antennal stem; antennomeres 3-11 with short decumbent pubescence (Plate 69 fig. 7). Pronotum transverse, ca. 1.4 times as wide as long, bisinuate basally and semi-circular anteriorly, with concave sides, prominent acute posterior and conspicuous anterior angles; carinae prominent; median cell moderately broad, extending to pronotal 0.7; lateral carinae feebly concave; anterior cells diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle small, hooded; hood small, narrow, bent backwards. Scutellum transverse, trapezoidal, truncate at apex (Plate 69 fig. 7). Elytra long, ca. 3.6 times longer than wide at humeri, parallel-sided, with four equally developed primary costae; all interstices with double rows of regular transverse cells; bottom of cells hairless; pubescence dense, short and decumbent (Plate 69 fig. 7). Tibiae and femoris straight, relatively narrow; tarsomeres 3-4 widened, tarsomeres 1-4 with plantar pad. Male aedeagus with straight gradually widened distally and constricted before apex median lobe; inner sac with scissors-like structure; phallobasal membrane 0.3 length of median lobe (Plate 69 figs 8-9).
Sexual dimorphism: Female is unknown.
Differential diagnosis: *Cladophorus carbonipennis* sp. nov. seems to be related to *C. halmaheraensis* sp. nov. and *Cladophorus obiensis* sp. nov., but may be differentiated by the uniformly dark brown to black upperside, shorter flabellum of antennomere 4 and noticeably different shape of the median lobe of the aedeagus (Plate 69 figs 7-9).
Distribution: Known only from Nabire area, Indonesian New Guinea.

***Cladophorus tertius* sp. nov.** (Plate 70 figs 1-3)
Holotype ♂ NME: E Indonesia, W New Guinea, Doberai Peninsula, Arfak Mts., S of Anggi Gigi Lake, env. vill. Uper, 01°19'09"S, 133°54'07"E, 1890-2100 m, primary mid-montane rainforest, 8.IX.2015, leg. D.Telnov.
Paratype 1♀ ICM: same label as in holotype.

Derivatio nominis: The name of the new species is derived from the Latin for "third", alluding to its yellow testaceous front third.
Description: Length 12.8-12.9 mm. Width across humeri 2.6-2.7 mm.
Dark brown to black. Pedicel, pronotum and elytral proximal fourth orange testaceous. Head without rostrum. Vertex with shallow triangular impression behind antennal prominence. Eyes large, interocular distance ca. 1.1 times shorter than eye diameter. Labrum transverse, rounded anteriorly; epistoma triangularly projected forward. Palps slender; ultimate palpomeres elongate, slightly narrowing distally, oblique and glabrous at apex. Antennal sockets separated by narrow lamina. Antennae






reaching over elytral two thirds, from antennomere 3 flabellate; antennomere 3 ca. 6 times longer than antennomere 2 and ca. 1.15 times longer than antennomere 4; flabellum of antennomere 3 subequal in length to relevant antennal stem, flabellae of antennomeres 4 and 5 ca. 1.3 times longer than relevant antennal stems; antennomeres 3-11 with short semi-erect pubescence (Plate 70 fig. 1). Pronotum transverse, ca. 1.3 times as wide as long, trapezoidal, bisinuate basally and strongly triangularly projected anteriorly, with concave sides, conspicuous acute posterior and pronounced blunt anterior angles; median cell narrow, extending to pronotal 0.6; lateral carinae curved, inconspicuous; anterior cells slightly diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle hooded; hood long, narrow, erect, distally bent backwards. Scutellum transverse, narrowing distally, profoundly triangularly emarginate at apex (Plate 70 fig. 1). Elytra long, ca. 4 times longer than wide at humeri, widening posteriorly, with four equally developed primary costae; all interstices with double rows of mostly transverse subrectangular cells; bottom of cells hairless; pubescence short and decumbent (Plate 70 fig. 1). Tibiae and femoris straight, narrow; tarsomeres 3-4 widened, tarsomeres 1-4 with developed plantar pad. Male aedeagus with straight and narrow median lobe, its constricted distal portion short and hooked in lateral view; inner sac with scissors-like structure; phallobasal membrane very short, ca. 0.1 length of median lobe (Plate 70 figs 2-3).

Sexual dimorphism: Similar to male, but eyes much smaller, antennae simply serrate.

Differential diagnosis: *Cladophorus tertius* sp. nov. resembles *C. longicornis* M'Leay, 1886 in coloration, but is easily differentiated by the shorter yellow testaceous part of the elytra; it is also quite different from all congeners in the shape of the median lobe of the aedeagus (Plate 70 figs 1-3).

Distribution: Known only from the Arfak Mountains in Indonesian New Guinea.

***Cladophorus anggiensis* sp. nov.** (Plate 62 figs 4-6)

Holotype ♂ NME: E Indonesia, W New Guinea, Doberai Peninsula, Arfak Mts., S of Anggi Gigi Lake, env. vill. Uper, 01°19'09"S, 133°54'07"E, 1890-2100 m, primary mid-montane rainforest, 8.IX.2015, leg. D.Telnov.

Paratype ♂ ICM: same label as in holotype

Derivatio nominis: The name of the new species is derived from the name of the locality (Anggi Gigi Lake), where the type series was collected.

Description: Length 10.4-11.1 mm. Width across humeri 2.2-2.3 mm.

Orange testaceous. Antennae, except, antennomeres 1-2, abdomen, tibiae distally and tarsi dark brown to black. Head without rostrum. Vertex with shallow roundish impression and deeper triangular excavation behind antennal prominence. Eyes relatively large, interocular distance subequal in length to eye diameter. Labrum transverse, rounded anteriorly and feebly emarginate medially; epistoma triangularly projected forward. Palps slender; ultimate maxillary palpomere elongate, oblique and glabrous at apex; ultimate labial palpomere elongate, widening distally, dentate and glabrous at apex. Antennal sockets separated by narrow lamina. Antennae reaching over elytral two thirds, from antennomere 3 flabellate; antennomere 3 ca. 6 times longer than antennomere 2 and ca. 1.2 times longer than antennomere 4; flabellum of antennomere 3 ca. 1.8 times shorter than relevant antennal stem, flabellae of antennomeres 4 and 5 subequal in length to relevant antennal stems; antennomeres 3-11 with short semi-erect pubescence (Plate 70 fig. 4). Pronotum transverse, ca. 1.3 times as wide as long, trapezoidal, bisinuate basally and triangularly projected anteriorly, with conspicuous acute posterior and prominent blunt anterior angles; median cell narrow, extending to pronotal 0.75; lateral carinae almost straight, conspicuous; anterior cells not diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle hooded; hood narrow, erect. Scutellum transverse, parallel-sided, profoundly semi-circularly emarginate at apex (Plate 70 fig. 4). Elytra long, ca. 4 times longer than wide at humeri, parallel-sided, with four equally developed primary costae; all interstices with double rows of small regular subquadrate cells; bottom of cells hairless; pubescence dense, short and decumbent (Plate 70 fig. 4). Tibiae and femoris straight, narrow; tarsomeres 2-4 widened, tarsomeres 1-4 with developed plantar pad. Male aedeagus with straight, proximally and distally narrowed median lobe, its constricted distal portion short and rounded in lateral view; inner sac with scissors-like structure; phallobasal membrane ca. 0.25 length of median lobe (Plate 70 figs 5-6).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Cladophorus anggiensis* sp. nov. is easily separable from the similarly coloured congeners by the relatively short male antennal flabellae, pronotal shape and scissors-like inner sac structure of the median lobe of the aedeagus (Plate 70 figs 4-6).

Distribution: Known only from the Arfak Mountains in Indonesian New Guinea.






***Cladophorus pusspenssatensis* sp. nov.** (Plate 70 figs 7-9)

Holotype ♂ NME: E Indonesia, Irian Jaya, 50 km S Nabire, Pusspenssat, 13.I.1997, A. Weigel leg.

Paratype 1♀ ICM: E Indonesia, Irian Jaya, 50 km S Nabire, Pusspenssat, 750 m, 31.XII.1997, A. Weigel leg.

Derivatio nominis: The name of the new species is derived from the locality where the type series was collected.

Description: Length 14.8-15.3 mm. Width across humeri 3.2-3.4 mm.

Orange testaceous. Antennae, except antennomere 1 at base and antennomere 2, elytra distally, tibiae distally, tarsi and abdomen dark brown to black. Head without rostrum. Vertex with prominent transverse impression behind antennal prominence. Eyes moderately large, interocular distance subequal in length to eye diameter. Labrum transverse, convex anteriorly; epistoma convex. Palps slender; ultimate palpomeres elongate, narrow, relatively small, obliquely narrowed and glabrous at apex. Antennal sockets separated by narrow lamina. Antennae attaining to elytral two thirds, from antennomere 3 flabellate; antennomere 3 ca. 9 times longer than antennomere 2 and ca. 1.2 times longer than antennomere 4; flabellum of antennomere 3 ca. 2 times shorter, flabellum of antennomere 4 ca. 1.1 times shorter and flabellum of antennomere 5 ca. 1.1 times longer than relevant antennal stem; antennomeres 3-11 with short sub-erect pubescence (Plate 70 fig. 7). Pronotum transverse, ca. 1.2 times as wide as long, feebly bisinuate basally and convex anteriorly, with almost parallel sides, small laterally projected acute posterior and rounded blunt anterior angles; median cell narrow, extending to pronotal 0.65; lateral carinae inconspicuous near sides and medially; anterior cells narrow, diverging anteriorly, formed by obliterate near anterior margin antero-lateral carinae. Mesothoracic spiracle small, hooded; hood small, bent backwards. Scutellum transverse, short, trapezoidal, broadly emarginate at apex (Plate 70 fig. 7). Elytra long, ca. 3.8 times longer than wide at humeri, parallel-sided, with four equally developed primary costae; all interstices with double rows of small regular transverse cells; bottom of cells hairless; pubescence dense, short and decumbent (Plate 70 fig. 7). Tibiae and femoris straight, narrow; tarsomeres 2-4 widened, plantar pad on tarsomeres 1-4, in tarsomere 1 occupying more than half its length. Male aedeagus with straight gradually narrowed distally median lobe, flattened and curved at apex; inner sac with scissors-like structure; phallobasal membrane ca. 0.5 length of median lobe (Plate 70 figs 8-9).

Sexual dimorphism: Female similar to male, but somewhat broader, eyes somewhat smaller and antennae serrate.

Differential diagnosis: *Cladophorus pusspenssatensis* sp. nov. is easily separated from most *Cladophorus* species by the short male antennal flabellae; it is distinguishable from the above described *C. anggiensis* sp. nov. and *C. tertius* sp. nov. by, also with short flabellae, by the coloration and the shape of the median lobe of the aedeagus; on the other hand, it may be differentiated from the similarly coloured *C. holynskii* sp. nov. by the uniformly testaceous femoris, more elongate pronotum with much more narrow median cell and scarcer elytral pubescence, as well as by the straight and more narrow median lobe of the aedeagus (Plate 70 figs 7-9).

Distribution: Known only from Indonesian New Guinea.

Pseudodontocerus Pic, 1921

Pseudodontocerus Pic, 1921: 12.

Type species: *Pseudodontocerus pulcher* Pic, 1921, by monotypy.

= *Carathrix* Kleine, 1926: 149.

Type species: *Carathrix pilosus* Kleine, 1926: 149, original designation.

Notes: Only two species of *Pseudodontocerus* Pic, 1921 have so far been described (Pic 1921; Kleine 1926; Bocák 2002). The genus may be distinguished from other metriorrhynchines by the long narrow flabellae stemming from the bases of relevant antennomeres and flabellate female antennae.

Distribution: Confined to New Guinea.

***Pseudodontocerus fuscatus* (Waterhouse, 1879) comb. nov.** (Plate 71 figs 1-3)

Cladophorus fuscatus Waterhouse, 1879: 64.

Material ca. 600 ♂♂ & ♀♀ ICM and ISNB: Papua New Guinea, Madang prov., Baiteta, light, O. Missa leg., dates: 18.III.1993 to 19.V.1993; 16.IV.1994; from 23.IV.1995 to 2.VII.1995; from 9.IV.1996 to 27.VII.1996.

Notes: *Pseudodontocerus fuscatus* seems to be a very common lycid species, at least in some areas in New Guinea, with several hundred specimens collected just at one site in Madang Province (the overwhelming majority being males). Although the antennal flabellae of this species are not as long as those of typical *Pseudodontocerus* (e.g., Plate 11, figs 1, 4) and the aedeagal structure is more remi-






niscent of typical *Cladophorus* (e.g., Plate 1, figs 2-3, 5-6), the way its relatively long flabellae are attached to antennal stems (i.e., at their bases, Plate 10, fig. 1) suggests it is in the intermediate position between the two genera. Therefore, as the easier observable character (the way flabellae are attached to antennal stems) is also supported by the long erect antennal pubescence, which may prove to be another autapomorphy of the genus, the species is tentatively transferred to *Pseudodontocerus*, pending a comprehensive analysis of this lineage of net-winged beetles based on more representative selection of taxa.

Distribution: New Guinea.

***Pseudodontocerus gigilacus* sp. nov.** (Plate 71 figs 4-6)

Holotype ♂ NME: E Indonesia, W New Guinea, Doberai Peninsula, Arfak Mts., S of Anggi Gigi Lake, 2-2.5 km NNE vill. Uper, 01°17'10"S, 133°54'18"E, 1900-2480 m, primary mid-montane rainforest, beaten, 9.IX.2015, leg. D.Telnov.

Paratype 1♂ ICM: E Indonesia, W New Guinea, Doberai Peninsula, Arfak Mts., S of Anggi Gigi Lake, env vill. Uper, 01°18'05"S, 133°54'24"E, 2200 m, edge of primary mid-montane rainforest, white light, 9-10.IX.2015 and 10-11.IX.2015, leg. D.Telnov.

Derivatio nominis: The name of the new species is derived from the locality where the type specimen was collected and the Latin for "lake".

Description: Length 8.8-10.8 mm. Width across humeri 2.0-2.1 mm.

Testaceous. Antennae, except antennomere 2, labrum, palps, metaventrite, abdomen, femurs and tibiae, except at base, and tarsi, except terminal tarsomere, dark brown. Head without rostrum. Vertex with prominent shallow roundish behind antennal prominence and conspicuous median carina. Eyes relatively large, interocular distance ca. 1.2 times shorter than eye diameter. Labrum relatively large, transverse, slightly convex anteriorly. Maxillary palps relatively long; ultimate palpomere elongate, almost parallel-sided and oblique distally, glabrous at apex. Labial palps very short; ultimate palpomere broad, pointed and glabrous at apex. Antennal sockets separated by narrow lamina. Antennae attaining to elytral three fourths, from antennomere 3 flabellate; antennomere 3 ca. 10 times longer than antennomere 2 and 1.1 times longer than antennomere 4; flabellae gradually transforming from arising from base of stem in antennomere 3 to arising from apex of stem in antennomere 10; flabellum of antennomere 3 ca. 1.9 times and flabellae of antennomeres 4 and 5 ca. 2.2 times longer than relevant antennal stem; antennomeres 3-11 with relatively long erect pubescence (Plate 71 fig. 4). Pronotum transverse, ca. 1.15 times as wide as long, bisinuate basally and triangularly projected anteriorly, with slightly concave sides, small acute posterior and conspicuous blunt anterior angles; median cell relatively broad, reaching pronotal 0.6; lateral carinae curved; anterior cells not diverging anteriorly, straight antero-lateral carinae inconspicuous in anterior third. Mesothoracic spiracle short, hooded; hood narrow, erect. Scutellum transverse, short, conspicuously semi-circularly emarginate at apex (Plate 71 fig. 4). Elytra long, ca. 4.1 times longer than wide at humeri, parallel-sided, with four equally developed primary costae; all interstices with double rows of regular subquadrate cells; bottom of cells mostly hairless; pubescence scarce, short and decumbent (Plate 71 fig. 4). Tibiae and femoris straight, femoris moderately broad, tibiae narrow; tarsomeres 3-4 widened, tarsomeres 1-4 with plantar pad. Male aedeagus with noticeably widening distally and concave in lateral view median lobe; inner sac with scissors-like structure, rings of "scissors" almost at one level; phallobasal membrane relatively short, ca. 0.4 length of median lobe (Plate 71 figs 5-6).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Pseudodontocerus gigilacus* sp. nov. is readily separated from all congeners by the uniformly testaceous upperside and antennal structure, with flabellae gradually transforming from arising from the base of stem in antennomere 3 to arising from the apex of stem in antennomere 10, as well as by the noticeably widening distally and concave in lateral view median lobe of the aedeagus (Plate 71 figs 4-6).

Distribution: Known only from the Arfak Mountains in Indonesian New Guinea.

***Pseudodontocerus hilaris* sp. nov.** (Plate 72 figs 1-3)

Holotype ♂ ICM: Papua New Guinea, 10 km N Madang, 2 km NNW Riwo, 9-10.II.1989, M. & R. Holyński leg.

Derivatio nominis: The name of the new species is derived from the Latin for "cheerful", alluding to its coloration.

Description: Length 10.2 mm. Width across humeri 2.2 mm.

Yellow testaceous. Antennae, anterior third pronotum medially and elytra, except band in the middle fifth, dark brown. Head without rostrum. Vertex with transverse impression behind antennal prominence and deep median groove between an-






tennal tubercles. Eyes small, interocular distance ca. 1.4 times greater than eye diameter. Labrum transverse, truncate anteriorly. Maxillary palps relatively long; ultimate palpomere elongate, conspicuously widened and oblique distally, glabrous at inner edge. Labial palps slender; ultimate palpomere elongate, oblique, glabrous and dentate at inner edge. Antennal sockets separated by minute lamina. Antennae nearly attaining to elytral apices, from antennomere 3 flabellate; antennomere 3 ca. 7 times longer than antennomere 2 and 1.4 times shorter than antennomere 4; flabellum of antennomere 3 ca. 5.75 times, flabellum of antennomere 4 ca. 7.5 times and flabellum of antennomere 5 ca. 8 times longer than relevant antennal stem; antennomeres 3-11 with relatively long erect pubescence (Plate 72 fig. 1). Pronotum transverse, ca. 1.2 times as wide as long, bisinuate basally and triangularly projected anteriorly, with straight sides, inconspicuous acute posterior and conspicuous acute anterior angles; median cell relatively broad, reaching anterior margin; lateral carinae smoothed, concave; anterior cells diverging anteriorly, antero-lateral carinae obliterate in anterior half. Mesothoracic spiracle short, hooded; hood minute, directed downwards. Scutellum transverse, narrowing distally, semi-circularly emarginate at apex (Plate 72 fig. 1). Elytra long, ca. 3.75 times longer than wide at humeri, parallel-sided, with four equally developed primary costae; all interstices with double rows of regular subquadrate cells; bottom of cells hairless; pubescence scarce, relatively long and semi-erect (Plate 72 fig. 1). Tibiae and femoris straight, femoris moderately broad, tibiae narrow; tarsomeres 3-4 widened, tarsomeres 1-4 with plantar pad. Male aedeagus with straight, triangularly narrowed distally and slightly outwardly bent at apex median lobe; inner sac with scissors-like structure, rings of "scissors" at different level; phallobasal membrane robust, leathery, ca. 0.5 length of median lobe (Plate 72 figs 2-3).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Pseudodontocerus hilaris* sp. nov. is readily separated from *P. pulcher* Pic, 1921 and other congeners by the coloration with broad yellow band on the dark brown elytra, as well as by the relatively broad, straight and triangularly narrowed distally median lobe of the aedeagus (Plate 72 figs 1-3).

Distribution: Known only from Madang, Papua New Guinea.

***Pseudodontocerus incultus* sp. nov.** (Plate 72 figs 4-6)

Holotype ♂ ICM: E Papua New Guinea, Morose Pr., Wau: Ecol. Inst., 1200 m, at light, 1-2.XII.1988, R. Holyński leg.

Paratype ♀ ICM: same label as in holotype.

Derivatio nominis: The name of the new species is derived from the Latin for "untidy", alluding to its long antennal flabellae.

Description: Length 11.2-12.8 mm. Width across humeri 2.2-2.8 mm.

Black. Metaventrite, abdominal ventrites 1-3, metacoxae, metatrochanters and proximal half of hind femoris bright orange testaceous. Head without rostrum. Vertex with transverse impression behind antennal prominence, without groove between antennal tubercles. Eyes small, interocular distance ca. 1.7 times greater than eye diameter. Labrum transverse, convex, emarginate anteriorly. Maxillary palps relatively long; ultimate palpomere elongate, conspicuously widened and oblique distally, glabrous at inner edge. Labial palps slender; ultimate palpomere elongate, oblique, glabrous and dentate at inner edge. Antennal sockets separated by narrow lamina. Antennae attaining to elytral seven eighths, from antennomere 3 flabellate; antennomere 3 ca. 7 times longer than antennomere 2 and subequal in length to antennomere 4; flabellae of antennomeres 3-5 ca. 7 times longer than relevant antennal stems; antennomeres 3-11 with long erect pubescence (Plate 72 fig. 4). Pronotum transverse, ca. 1.4 times as wide as long, almost straight basally and semi-triangularly projected anteriorly, with almost parallel sides, projected laterally acute posterior and rounded anterior angles; median cell narrow, reaching anterior margin; lateral carinae obsolete near median cell, concave; antero-lateral carinae obsolete. Mesothoracic spiracle large, short, not hooded. Scutellum transverse, narrowing distally, slightly semi-circularly emarginate at apex (Plate 72 fig. 4). Elytra long, ca. 4.1 times longer than wide at humeri, parallel-sided, dehiscent distad of proximal two fifths, with four equally developed primary costae; all interstices with double rows of regular subquadrate cells; bottom of cells hairless; pubescence moderately dense, relatively long and erect (Plate 72 fig. 4). Tibiae and femoris straight, narrow; tarsomeres 3-4 widened, tarsomeres 1-4 with plantar pad. Male aedeagus with narrow (in lateral view), noticeably curved and constricted distally median lobe; inner sac with scissors-like structure, rings of "scissors" at one level; phallobasal membrane ca. 0.4 length of median






lobe (Plate 72 figs 5-6).
Sexual dimorphism: Female similar to male, but somewhat broader, with shorter antennal flabellae, e.g., flabellum of antennomere 3 only ca. 2.7 times longer than antennal stem.
Differential diagnosis: *Pseudodontocerus incultus* sp. nov. may be distinguished from *P. pilosus* (Kleine, 1926) by the uniformly black elytra, as well as by the narrow, curiously curved and constricted distally median lobe of the aedeagus (Plate 72 figs 4-6).
Distribution: Known only from Wau, Papua New Guinea.

***Pseudodontocerus maculihumeralis* sp. nov.** (Plate 73 figs 1-3)
Holotype ♂ ISNB: Papua New Guinea, Madang prov., Baiteta, light, 18.II.1996, O. Missa leg.
Paratypes 2♂ & 1♀ ICM & ISNB: same label as in holotype, but: 16.V.1996; 20.V.1996; 5.VI.1996.

Derivatio nominis: The name of the new species is derived from the Latin for "with a spot on the shoulder", alluding to its coloration.
Description: Length 6.4-7.1 mm. Width across humeri 1.6-1.7 mm.
Dark brown. Pronotal margin narrowly, elytral humeri, trochanters and bases of femoris testaceous. Head without rostrum. Vertex with two deep round impressions behind antennal prominence, without median groove between antennal tubercles. Eyes relatively large, interocular distance ca. 1.1 times greater than eye diameter. Labrum transverse, slightly emarginate anteriorly. Maxillary palps slender; ultimate palpomere elongate, narrow, slightly narrowed and oblique distally. Labial palps small; ultimate palpomere globular, glabrous and pointed distally. Antennal sockets separated by narrow lamina. Antennae attaining to elytral three fourths, from antennomere 3 flabellate; antennomere 3 ca. 8 times longer than antennomere 2 and subequal in length to antennomere 4; flabellum of antennomere 3 ca. 1.4 times, flabellum of antennomere 4 ca. 1.7 times and flabellum of antennomere 5 ca. 1.8 times longer than relevant antennal stem; antennomeres 3-11 with short sub-erect pubescence (Plate 73 fig. 1). Pronotum transverse, ca. 1.3 times as wide as long, bisinuate basally and semi-triangularly projected anteriorly, with strongly concave sides, conspicuous acute posterior and evident blunt anterior angles; median cell relatively broad, extending to pronotal 0.8; lateral carinae conspicuous, concave; anterior cells diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle small, hooded; hood long, narrow, bent backwards. Scutellum small, elongate, parallel-sided, triangularly emarginate at apex (Plate 73 fig. 1). Elytra moderately long, ca. 3 times longer than wide at humeri, parallel-sided, with four equally developed primary costae; all interstices with double rows of mostly elongate cells; bottom of cells hairless; pubescence scarce, short and decumbent (Plate 73 fig. 1). Tibiae and femoris straight, moderately broad; tarsomeres 3-4 widened, tarsomeres 1-4 with plantar pad. Male aedeagus with straight, relatively broad and slightly outwardly bent at apex median lobe; inner sac with scissors-like structure, rings of "scissors" at one level; phallobasal membrane ca. 0.35 length of median lobe (Plate 73 figs 2-3).
Sexual dimorphism: Female similar to male, but eyes smaller and antennae simply dentate.
Differential diagnosis: *Pseudodontocerus maculihumeralis* sp. nov. is readily separated from congeners by the shorter antennal flabellae, rufous humeri and straight, relatively broad median lobe of the aedeagus (Plate 73 figs 2-3).
Notes: The dentate female antennae in *P. maculihumeralis* sp. nov. are quite different from other species of the genus where females are known. After a re-analysis of this group of net-winged beetles this species may prove to be not congeneric with the other members of *Pseudodontocerus*.
Distribution: Known only from Madang, Papua New Guinea.

***Pseudodontocerus variicornis* sp. nov.** (Plate 73 figs 4-6)
Holotype ♂ ISNB: Papua New Guinea, Madang prov., Baiteta, light, 15.V.1996, O. Missa leg.
Paratypes 75 ♂♂: same label, dates: 21.IV.1993; 23.IV.1993; 16.IV.1994; 7.VI.1995; 15.VII.1995; 18.III.1996; IV.1996; 8.IV.1996; 9.IV.1996; 11.IV.1996; 13.IV.1996; 22.IV.1996; 1.V.1996; 4.V.1996; 14.V.1996; 15.V.1996; 16.V.1996; 23.V.1996; 29.V.1996; 30.V.1996; 3.VI.1996; 4.VI.1996; 5.VI.1996; 12.VI.1996; 15.VI.1996; 18.VI.1996; 24.VI.1996; 25.VI.1996; 10.VII.1996; 15.VII.1996; 17.VII.1996; 18.VII.1996; 23.VII.1996; 27.VII.1996 (ICM and ISNB); 1♂ NME: Indonesia, Irian Jaya, Nabire, 50 km S Flaga, road Puspenssat, 3°29'53"S, 135°43'83"E, 18.II.1998, Weigel leg.; 1♂ DTC: E Indonesia, West Papua, Fak-Fak peninsula, 5-7 km N Fak-Fak, 02°53'26"S, 132°18'22"E, 300-400 m, primeval lowland rainforest on limestone, 25.IX.2010, leg. M.Kalniņš.

Derivatio nominis: The name of the new species is derived from the Latin for "with various antennae", alluding to the variability of its antennal






flabellae.

Description: Length 4.8-7.2 mm. Width across humeri 1.0-1.6 mm.

Dark brown to black. Antennomere 2 and posterior half of pronotum light brown; trochanters and proximal half of femoris testaceous. Head without rostrum. Vertex with two small deep round impressions behind antennal prominence. Eyes large, interocular distance subequal in length to eye diameter. Labrum transverse, convex anteriorly. Maxillary palps slender; ultimate palpomere elongate, narrow, slightly narrowed and oblique distally. Labial palps small; ultimate palpomere globular, glabrous and pointed distally. Antennal sockets separated by narrow lamina. Antennae attaining to elytral three fourths, from antennomere 3 flabellate; antennomere 3 ca. 6 times longer than antennomere 2 and subequal in length to antennomere 4; flabellum of antennomere 3 ca. 1.5 times, flabellum of antennomere 4 ca. 2.2 times and flabellum of antennomere 5 ca. 2.3 times longer than relevant antennal stem; antennomeres 3-11 with short sub-erect pubescence (Plate 73 fig. 4). Pronotum transverse, ca. 1.2 times as wide as long, slightly bisinuate basally and semi-triangularly projected anteriorly, with parallel sides, inconspicuous acute posterior and blunt anterior angles; median cell narrow, extending to pronotal 0.7; lateral carinae straight; anterior cells slightly diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle small, hooded; hood relatively long, narrow, bent backwards. Scutellum transverse, slightly narrowing distally, deeply semi-circularly emarginate at apex (Plate 73 fig. 4). Elytra long, ca. 3.4 times longer than wide at humeri, parallel-sided, with four equally developed primary costae; all interstices with double rows of irregular subquadrate cells; bottom of cells hairless; pubescence scarce, short and decumbent (Plate 73 fig. 4). Tibiae and femoris straight, moderately broad; tarsomeres 3-4 widened, tarsomeres 1-4 with plantar pad. Male aedeagus with straight, moderately broad and triangularly narrowed distally median lobe; inner sac with scissors-like structure, rings of "scissors" at one level; phallobasal membrane ca. 0.4 length of median lobe (Plate 73 figs 5-6).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Pseudodontocerus varicornis* sp. nov. is readily distinguished from the somewhat similar *P. maculihumeralis* sp. nov. by the uniformly dark brown elytra, conspicuously concave pronotal sides, as well as by the more acute and not outwardly bent at apex median lobe of the aedeagus (Plate 73 figs 4-6).

Variation. In some of the paratypes the flabellum of antennomere 3 is noticeably shorter than in the holotype, only from 1.1 to 1.2 times longer than stem; besides, in some paratypes the body is entirely dark brown to black.

Distribution: Indonesian New Guinea and Madang Province, Papua New Guinea.

***Pseudodontocerus villosus* sp. nov.** (Plate 73 figs 7-10)

Holotype ♂ ISNB: Papua New Guinea, Madang prov., Baiteta, light, 18.VII.1996, O. Missa leg.

Derivatio nominis: The name of the new species is derived from the Latin for "hairy", alluding to its elytral pubescence.

Description: Length 6.0 mm. Width across humeri 1.4 mm.

Orange testaceous. Head, antennae, except bases of antennomeres 1 and 2, elytra, except at shoulders and at proximal scutellar triangle, abdomen, femoris distally, tibiae and tarsi dark brown to black. Head without rostrum. Vertex with roundish impression behind antennal prominence. Eyes moderately large, interocular distance subequal in length to eye diameter. Labrum small, transverse, slightly emarginate anteriorly. Palps slender; ultimate palpomeres elongate, narrow, almost parallel-sided, oblique distally. Antennal sockets separated by narrow lamina. Antennae attaining to elytral two thirds, from antennomere 3 flabellate; antennomere 3 ca. 6 times longer than antennomere 2 and ca. 1.2 times longer than antennomere 4; flabellum of antennomere 3 ca. 1.2 times shorter than relevant antennal stem, flabellae of antennomeres 4 and 5 ca. 1.3 times longer than relevant antennal stem; antennomeres 3-11 with short suberect pubescence (Plate 73 fig. 4). Pronotum transverse, ca. 1.3 times as wide as long, bisinuate basally and slightly convex anteriorly, with noticeably concave sides, conspicuous acute posterior and blunt rounded anterior angles; median cell broad, extending to pronotal 0.65; lateral carinae inconspicuous, slightly curved; antero-lateral carinae obsolete. Mesothoracic spiracle small, hooded; hood dorsal, erect, minute. Scutellum transverse, slightly narrowing distally, triangularly emarginate at apex (Plate 73 fig. 4). Elytra long, ca. 3.3 times longer than wide at humeri, parallel-sided, with four equally developed primary costae; all interstices with double rows of small roundish cells; bottom of cells hairless; pubescence dense, short and semi-erect (Plate 73 fig. 4). Tibiae and femoris straight, relatively broad; tarsomeres 3-4 widened, tarsomeres






1-4 with developed plantar pad. Male aedeagus with curved, robust, rounded distally median lobe; inner sac with scissors-like structure, rings of "scissors" at one level, inner sac elongate sclerotized structure straight in lateral view; phallobasal membrane ca. 0.3 length of median lobe (Plate 73 figs 9-10).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Pseudodontocerus villosus* sp. nov. is readily distinguished from the congeners by the mostly orange testaceous body, broad and short pronotal median cell, absent antero-lateral pronotal carinae, relatively long and dense elytral pubescence, as well as by the curved robust median lobe of the aedeagus with straight in lateral view inner sac elongate sclerotized structure (Plate 73 figs 7-10).

Distribution: Madang, Papua New Guinea.

Cautires Waterhouse, 1879

Cautires Waterhouse, 1879: 36.

Type species: *Cautires excellens* Waterhouse, 1878, designated by Bourgeois, 1891.

Notes: Several hundred species are listed in the genus *Cautires* Waterhouse, 1879, with many more still undescribed. Several dozen *Cautires* species have been reported from New Guinea and adjacent islands (e.g., Kleine 1926, 1933).

It seems quite probable that *Cautires* actually represents a polyphyletic taxon, with inclusion of species from current (also possibly polyphyletic) *Cladophorus* Guerin-Meneville, 1830, *Xylobanus* Waterhouse, 1879 and related genera. The actual phylogeny of this lineage of net-winged beetles is in apparent need of examination on the basis of a comprehensive phylogenetic analysis.

Distribution: Along with *Xylobanus* Waterhouse, 1879, *Cautires* is one of the two most widespread metriorrhynchine genera. Distributed in East Palaearctic, Oriental, Afrotropical and Papuan regions (Kleine 1933).

***Cautires brunneus* sp. nov.** (Plate 74 fig. 1-3)

Holotype ♂ ISNB: Papua New Guinea, Madang prov., Baiteta, light, 16.V.1996, O. Missa leg.

Paratypes 11♂ ICM & ISNB: same label as in holotype, but 16.IV.1994; 9.IV.1996; 11.IV.1996; 13.V.1996; 20.V.1996; 23.V.1996; 25.VI.1996; 3.VII.1996; 11.VII.1996; 18.VII.1996; 27.VII.1996.

Derivatio nominis: The name of the new species is derived from the Latin for "brown", alluding to its coloration.

Description: Length 7.6-8.6 mm. Width across humeri 1.7-1.9 mm.

Dark brown to black. Breast, narrow spots on elytra near scutellum, coxae, trochanters and proximal half of femoris testaceous. Head without rostrum. Vertex with transverse impression and narrow median keel behind antennal prominence. Eyes relatively large, interocular distance ca. 1.1 times shorter than eye diameter. Labrum small, transverse, rounded anteriorly; epistoma convex. Palps slender; ultimate palpomeres elongate, narrowed distally. Antennal sockets separated by relatively narrow trapezoidal lamina. Antennae attaining to elytral two thirds, from antennomere 3 flabellate; antennomere 3 ca. 5 times longer than antennomere 2 and subequal in length to antennomere 4; flabellum of antennomere 3 ca. 1.6 times, flabellum of antennomere 4 ca. 2.3 times and flabellum of antennomere 5 ca. 2.8 times longer than relevant antennal stem; antennomeres 3-11 with long scarce erect pubescence (Plate 74 fig. 1). Pronotum slightly transverse, ca. 1.1 times as wide as long, slightly bisinuate basally and convex anteriorly and triangularly projected forward anteriorly, with conspicuously concave sides, acute posterior and rounded anterior angles; median cell narrow, attaining to 0.7 pronotal length; lateral carinae conspicuous, curved; anterior cells diverging anteriorly, formed by slightly concave antero-lateral carinae. Mesothoracic spiracle small, hooded; hood minute, erect. Scutellum transverse, parallel-sided, triangularly emarginate at apex (Plate 74 fig. 1). Elytra long, ca. 3.3 times longer than wide at humeri, parallel-sided, with four equally developed primary costae, not surpassing much secondary costae in stoutness; interstices with double rows of regular, mostly elongate cells; dense, short and decumbent (Plate 74 fig. 1). Tibiae and femoris straight, relatively broad; tarsomeres 3-4 widened, tarsomeres 1-4 with plantar pad. Male aedeagus with straight, sharpened distally and widened medially in lateral view median lobe; distal opening occupying ca. 0.4 length of median lobe; inner sac with scissors-like structure, paired median thorns and protruding oval distal part; phallobasal membrane attaining to ca. 0.3 of median lobe (Plate 74 figs 2-3).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Cautires brunneus* sp. nov. is apparently close to *C. mimicus* Kleine, 1926, known by one specimen from Haveri (Kleine 1926), separable by the light brown streak on elytral base and male genital structure: the median lobe is somewhat less widened medially and not outwardly bent distally in lateral view (Plate 74 figs 1-3).









Distribution: Known only from Madang, Papua New Guinea.

***Cautires dituaoides* sp. nov.** (Plate 74 fig. 4-6)
Holotype ♂ ISNB: Papua New Guinea, Madang prov., Baiteta, light, 9.IV.1996, O. Missa leg.
Paratypes 3♂ ICM & ISNB: same label as in holotype, but 9.IV.1996; 13.V.1996; 12.VI.1996.

Derivatio nominis: The name of the new species is derived from the genus name *Ditua* Waterhouse, 1879, alluding to the similarity of its coloration and, to some extent, pronotal structure to those of the mentioned genus.
Description: Length 6.6-8.8 mm. Width across humeri 1.7-2.2 mm.
Orange testaceous. Head, antennae, except scapus basally and pedicel, pronotum, except at margins, elytral distal third, abdomen, except ultimate sternite, black; femoris distally and tibiae brown. Head without rostrum. Vertex with two deep oblique impressions behind antennal prominence. Eyes small, interocular distance ca. 1.7 times greater than eye diameter. Labrum large, transverse, widening and rounded anteriorly, slightly emarginate medially. Palps slender; ultimate palpomeres elongate, pointed and glabrous at apex. Antennal sockets separated by narrow lamina. Antennae attaining to elytral three fourths, from antennomere 3 strongly serrate; antennomere 3 ca. 5 times longer than antennomere 2 and subequal in length to antennomere 4; antennomeres 3-11 with short dense decumbent pubescence (Plate 74 fig. 4). Pronotum transverse, ca. 1.3 times as wide as long, almost parallel-sided, slightly bisinuate basally and convex anteriorly, with slightly concave sides, acute posterior and rounded anterior angles; median cell broad, almost attaining anterior margin; lateral carinae conspicuous, almost straight; anterior cells not diverging anteriorly, formed by straight antero-lateral carinae, weakened near anterior margin. Mesothoracic spiracle small, hooded; hood narrow, erect. Scutellum transverse, slightly narrowing distally, triangularly emarginate at apex (Plate 74 fig. 4). Elytra long, ca. 3.4 times longer than wide at humeri, slightly narrowing distally, with four equally developed primary costae; interstices with double rows of small transverse cells; bottom of cells hairless; pubescence dense, short and decumbent (Plate 74 fig. 4). Tibiae and femoris straight, relatively broad; tarsomeres 2-4 widened, tarsomeres 1-4 with plantar pad. Male aedeagus with relatively stout, gradually widened distally and conspicuously curved in lateral view median lobe; inner sac with paired elongate distal structure and outwardly projected spine distally; phallobasal membrane stout, semi-sclerotized, attaining to half of median lobe (Plate 74 figs 5-6).
Sexual dimorphism: Female is unknown.
Differential diagnosis: *Cautires dituaoides* sp. nov. can be separated from congeners by the combination of coloration, pointed ultimate palpomeres, serrate male antennae and broad and almost reaching anterior margin median pronotal cell, as well as by the long and semi-sclerotized phallobasal membrane of the aedeagus (Plate 74 figs 4-6). It resembles in coloration *Ditua dichroma* (Boisduval, 1835), from which it differs by the absent spine on the ultimate sternite, as well as by the different type of the aedeagus.
Distribution: Known only from Madang, Papua New Guinea.

***Cautires eniclasoides* sp. nov.** (Plate 74 fig. 7-9)
Holotype ♀ NME: Indonesia, Irian Jaya, 50 km S Nabire, Ilaga road, Pusppensaat Station, 3°29.5'S, 135°43.8'E, 300 m, VIII-IX.1991, P. Hoyes leg.

Derivatio nominis: The name of the new species is derived from the genus name *Eniclases* Waterhouse, 1879, alluding to the similarity of its pronotal structure to that of *Eniclases*.
Description: Length 8.0 mm. Width across humeri 1.7 mm.
Uniformly black. Head without rostrum. Vertex with shallow transverse impression behind antennal prominence. Eyes small, interocular distance ca. 1.6 times greater than eye diameter. Labrum small, transverse. Maxillary palps short and stout; ultimate palpomeres slightly longer than wide, almost parallel-sided, oblique distally. Antennal sockets separated by narrow lamina. Antennae attaining to elytral three fifths, flattened, serrate; antennomere 3 ca. 9 times longer than antennomere 2 and subequal in length to antennomere 4; antennomeres 3-11 with short sub-erect pubescence (Plate 74 figs 7). Pronotum transverse, ca. 1.3 times as wide as long, trapezoidal, slightly bisinuate basally and almost truncate anteriorly, with slightly concave sides, conspicuous acute posterior and evident blunt anterior angles; median cell narrow, diamond-shaped, extending to pronotal 0.7; lateral carinae inconspicuous; anterior cells strongly diverging anteriorly, formed by straight antero-lateral carinae, triangular proximally (Plate 74 figs 8). Mesothoracic spiracle slightly protruding, not hooded. Scutellum transverse, rounded. Elytra long, ca. 3.8 times longer than wide at humeri, parallel-sided, with four






equally developed primary costae; interstices with double rows of irregular roundish cells; bottom of cells hairless; pubescence scarce, short and decumbent (Plate 74 figs 7-8). Tibiae and femoris straight, moderately broad; tarsomeres 3-4 widened, plantar pad developed. Female external genitalia with free, elongate, relatively slender coxites; valvifers semi-attached to coxites, narrow, almost straight, ca. 2 times longer than coxites; styli elongate, robust; vagina sclerotized (Plate 74 fig. 9).
Sexual dimorphism: Male is unknown.
Differential diagnosis: *Cautires eniclasoides* sp. nov. is readily distinguished from all congeners by the pronotal structure (Plate 74 fig. 8), more reminiscent of that of the genus *Eniclases*, from which it is separable by the structure of its elytra.
Distribution: Known only from Indonesian New Guinea.

***Cautires extraneus* sp. nov.** (Plate 75 figs 1-4)
Holotype ♂ NME: E Indonesia, W New Guinea, Doberai Peninsula, Arfak Mts., S of Anggi Gigi Lake, 2-2.5 km NNE vill. Uper, 01°17'10"S, 133°54'18"E, 1900-2480 m, primary mid-montane rainforest, 9.IX.2015, leg. D.Telnov.

Derivatio nominis: The name of the new species is derived from the Latin for "extraneous", alluding to its narrow body.
Description: Length 8.6 mm. Width across humeri 1.4 mm.
Orange testaceous. Antennae, except antennomere 2, and legs dark brown to black. Rostrum absent. Vertex with roundish impression behind antennal prominence. Eyes large, interocular distance ca. 1.2 times greater than eye diameter. Labrum small, subquadrate, truncate anteriorly; epistoma emarginate medially. Palps slender; ultimate palpomeres slightly elongate, semi-globular, oblique at apex. Antennal sockets separated by minute lamina. Antennae attaining to elytral three fifths, from antennomere 3 flattened, serrate; antennomere 3 ca. 5 times longer than antennomere 2 and ca. 1.1 times shorter than antennomere 4; antennomeres 3-11 with short sub-erect pubescence (Plate 75 fig. 1). Pronotum transverse, ca. 1.25 times as wide as long, trapezoidal, bisinuate basally and triangularly projected anteriorly, with laterally projected acute posterior and apparent blunt anterior angles; median cell narrow, extending to pronotal 0.65; lateral carinae concave; anterior cells slightly diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle small, hooded; hood elongate, narrow, erect. Scutellum transverse, parallel-sided, triangularly emarginate at apex (Plate 75 fig. 1). Elytra very long, ca. 4.6 times longer than wide at humeri, parallel-sided, with four equally developed primary costae; interstices with double rows of irregular elongate cells; pubescence dense, short and decumbent (Plate 75 fig. 1). Tibiae and femoris narrow, straight; tarsomeres 2-4 widened, tarsomeres 1-4 with plantar pad. Male ultimate sternite with brush of longer bristles ventrally (Plate 75 fig. 2). Aedeagus with abruptly widened distally median lobe, distal opening occupying ca. 0.4 its length; inner sac with circular distal bulge bearing dense minute thorns and paired elongate lateral thorns; phallobasal membrane membranous, relatively large, ca. 0.45 median lobe (Plate 75 figs 3-4).
Sexual dimorphism: Female is unknown.
Differential diagnosis: *Cautires extraneus* sp. nov. may be easily distinguished from the congeners by the very narrow body, serrate antennae and abruptly widened distally median lobe of the aedeagus, with circular distal bulge bearing dense minute thorns and paired elongate lateral thorns (Plate 75 figs 1-4).
Distribution: Known only from the Arfak Mountains in Indonesian New Guinea.

***Cautires ignotus* sp. nov.** (Plate 75 figs 5-7)
Holotype ♂ ISNB: Papua New Guinea, Madang prov., Baiteta, light, 16.IV.1996, O. Missa leg.
Paratypes 4♂ ICM & ISNB: same label as in holotype, but 28.V.1996; 24.VI.1996.

Derivatio nominis: The name of the new species is derived from the Latin for "unknown".
Description: Length 5.5-7.3 mm. Width across humeri 1.3-1.6 mm.
Testaceous. Antennae distally, head, elytra, except at humeri and along suture in proximal half, dark brown. Head without rostrum. Vertex with deep triangular impression behind antennal prominence. Eyes small, interocular distance ca. 1.6 times greater than eye diameter. Labrum small, transverse, truncate anteriorly. Maxillary palps slender; ultimate palpomere elongate, slightly narrowed, oblique and glabrous at apex. Labial palps minute; ultimate palpomere small, elongate, pointed and glabrous at apex. Antennal sockets separated by minute lamina. Antennae attaining to elytral three fourths, from antennomere 3 flabellate; antennomere 3 ca. 5 times longer than antennomere 2 and 1.2 times longer than antennomere 4; flabellum of antennomere 3 ca. 1.3 times shorter than stem, flabellum of antennomere 4 ca. 2.1 times






and flabellum of antennomere 5 ca. 2.3 times longer than relevant antennal stem; antennomeres 3-11 with short sub-erect pubescence (Plate 75 fig. 5). Pronotum transverse, ca. 1.2 times as wide as long, parallel-sided, bisinuate basally and slightly convex anteriorly, with inconspicuous acute posterior and evident blunt anterior angles; median cell relatively broad, extending to pronotal 0.85; lateral carinae curved; anterior cells broad, not diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle small, hooded; hood narrow, bent backwards. Scutellum transverse, slightly narrowing distally, triangularly emarginate at apex (Plate 75 fig. 5). Elytra long, ca. 3.8 times longer than wide at humeri, widest at humeri, parallel-sided in distal four fifths, with four equally developed primary costae; interstices with double rows of cells of small, mostly transverse rectangular cells; bottom of cells hairless; pubescence dense, short and decumbent (Plate 75 fig. 5). Tibiae and femoris straight, femoris moderately broad, tibiae narrow; tarsomeres 3-4 widened, with plantar pad, tarsomeres 1 and 2 with apical plantar pad. Male aedeagus with gradually, but prominently widened distally median lobe; inner sac with paired distal structure and outwardly protruding thorn; phallobasal membrane semi-sclerotized, attaining to ca. 0.6 of median lobe (Plate 75 figs 6-7).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Cautires ignotus* sp. nov. is readily separated from congeners by the coloration, antennal structure, parallel-sided pronotum with feebly convex anterior margin and paired distal structure and outwardly protruding thorn of the inner sac of the aedeagal median lobe, as well as by the semi-sclerotized phallobasal membrane, attaining to ca. 0.6 of median lobe (Plate 75 figs 6-7).

Distribution: Known only from Madang, Papua New Guinea.

***Cautires maturnus* Kleine, 1926** (Plate 75 figs 8-10)

Cautires maturnus Kleine, 1926: 150

Material 49♂ & 14♀ ICM & ISNB: Papua New Guinea, Madang prov., Baiteta, light, O. Missa leg, dates: 10.IV.1993; 16.IV.1994; 1995; 16.IV.1995; 13.IV.1996; 15.IV.1996; 22.IV.1996; 16.V.1996; 20.V.1996; 27.V.1996; 28.V.1996; 30.V.1996; 3.VI.1996; 4.VI.1996; 5.VI.1996; 10.VI.1996; 11.VI.1996; 14.VI.1996; 18.VI.1996; 24.VI.1996; 25.VI.1996; 26.VI.1996; 27.VI.1996; 3.VII.1996; 4.VII.1996; 15.VII.1996; 17.VII.1996; 18.VII.1996; 23.VII.1996; 24.VII.1996; 25.VII.1996; 27.VII.1996.

Distribution: New Guinea: Paomomu River, Moroka, Dilo, Fiume Pirari, Ighiberei, Bujakori (Kleine 1926); Madang, Papua New Guinea.

***Cautires miklukhomaklaii* sp. nov.** (Plate 75 figs 11-13)

Holotype ♂ ISNB: Papua New Guinea, Madang prov., Baiteta, light, 23.VII.1996, O. Missa leg.

Paratypes 45♂ ICM & ISNB: same label as in holotype, dates: 24.III.1993; 18.V.1993; 8.IX.1993; 16.IV.1994; 2.VII.1995; IV.1996; 8.IV.1996; 9.IV.1996; 11.IV.1996; 13.IV.1996; 17.IV.1996; 22.IV.1996; 30.IV.1996; 15.V.1996; 16.V.1996; 23.V.1996; 29.V.1996; 30.V.1996; 3.VI.1996; 5.VI.1996; 19.VI.1996; 24.VI.1996; 26.VI.1996; 3.VII.1996; 4.VII.1996; 23.VII.1996; 27.VII.1996; paratype ♀: Papua New Guinea, Madang prov., Baiteta, fogging, 19.III.1993, O. Missa leg.

Derivatio nominis: The new species is named after the famous XIX century explorer of New Guinea, N.N. Miklukho-Maklai.

Description: Length 5.2-5.9 mm. Width across humeri 1.2-1.4 mm.

Dark brown. Antennomere 2, proximal half of pronotum, trochanters and very bases of femoris light brown. Head without rostrum. Vertex with deep transverse impression just behind antennal prominence. Eyes large, interocular distance ca. 1.4 times shorter than eye diameter. Labrum small, transverse, truncate anteriorly. Palps slender; ultimate palpomeres small, elongate, almost pointed distally and glabrous at apex. Antennal sockets separated by minute lamina. Antennae attaining to elytral middle, from antennomere 3 flabellate; antennomere 3 ca. 9 times longer than antennomere 2 and 1.4 times longer than antennomere 4; flabellum of antennomere 3 ca. 1.6 times, flabellum of antennomere 4 ca. 2.4 times and flabellum of antennomere 5 ca. 2.8 times longer than relevant antennal stem; antennomeres 3-11 with short sub-erect pubescence (Plate 75 fig. 11). Pronotum transverse, ca. 1.3 times as wide as long, trapezoidal, slightly bisinuate basally and strongly triangularly projected anteriorly, with inconspicuous acute posterior and evident blunt anterior angles; median cell narrow, extending to pronotal 0.7; lateral carinae inconspicuous, concave; anterior cells not diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle small, hooded; hood narrow, erect. Scutellum subquadrate, slightly narrowing distally, semi-circularly emarginate at apex (Plate 75 fig. 11). Elytra long, ca. 3.6 times longer than wide at humeri, parallel-sided, with four equally developed primary costae; interstices






1 and 5 with double rows of irregular subquadrate cells; interstices 2-3 with double rows of cells at proximal thirds; interstice 4 with double row of cells at proximal two thirds; bottom of cells hairless; pubescence dense, short and decumbent (Plate 75 fig. 11). Tibiae and femoris straight, moderately broad; tarsomeres 2-4 widened, with plantar pad (tarsomeres 1 and 2 with minute apical plantar pad). Male aedeagus with relatively broad, gradually widened distally and rounded at apex; inner sac with paired basal structure and a pair of bracket-like structures distally (Plate 75 figs 12-13).

Sexual dimorphism: Female similar to male, but larger, eyes smaller and antennae serrate.

Differential diagnosis: *Cautires miklukhomaklaii* sp. nov. is distinguished from congeners by the broad pronotum with relatively short median areola, weak elytral reticulation, with secondary costae disappearing in the central part of interstices 2-4, and gradually widened distally median lobe of the aedeagus (Plate 75 figs 11-13).

Variation. In some of the paratypes the pronotum is entirely testaceous, while in others it is uniformly dark brown.

Distribution: Known only from Madang, Papua New Guinea.

***Cautires picipennis* sp. nov.** (Plate 76 figs 1-3)

Holotype ♂ ISNB: Papua New Guinea, Madang prov., Baiteta, light, 24.IV.1996, O. Missa leg.

Paratypes 13♂ ICM & ISNB: same label as in holotype, but 16.IV.1994; 9.IV.1996; 16.IV.1996; 22.IV.1996; 23.IV.1996; 29.IV.1996; 15.V.1996; 16.V.1996; 20.V.1996; 30.V.1996; 20.VI.1996.

Derivatio nominis: The name of the new species is derived from the Latin for "with grayish wings", alluding to its coloration.

Description: Length 4.9-6.0 mm. Width across humeri 1.1-1.4 mm.

Dark brown to grayish black. Metaventrite and trochanters light brown. Pronotal sides narrowly light brown. Head without rostrum. Vertex with deep fine transverse groove behind antennal prominence. Eyes relatively large, interocular distance ca. 1.4 times greater than eye diameter. Labrum small, transverse, convex anteriorly. Palps slender; ultimate palpomeres small, elongate, almost pointed distally and glabrous at apex. Antennal sockets separated by minute lamina. Antennae attaining to elytral two thirds, from antennomere 3 flabellate; antennomere 3 ca. 8 times longer than antennomere 2 and 1.1 times longer than antennomere 4; flabellum of antennomere 3 ca. 1.3 times, flabellum of antennomere 4 ca. 1.5 times and flabellum of antennomere 5 ca. 2 times longer than relevant antennal stem; antennomeres 3-11 with short sub-erect pubescence (Plate 76 fig. 1). Pronotum transverse, ca. 1.2 times as wide as long, bisinuate basally, somewhat widened and semi-circularly projected anteriorly, with slightly concave sides, inconspicuous acute posterior and evident blunt anterior angles; median cell narrow, extending to pronotal 0.65; lateral carinae short, straight; anterior cells rectangular, formed by very fine antero-lateral carinae. Mesothoracic spiracle small, hooded; hood narrow, bent backwards. Scutellum subquadrate, parallel-sided, triangularly emarginate at apex (Plate 76 fig. 1). Elytra long, ca. 4.2 times longer than wide at humeri, parallel-sided, with four equally developed fine primary costae; all interstices with double rows of rectangular, mostly elongate cells; bottom of cells hairless; pubescence dense, relatively long and erect (Plate 76 fig. 1). Tibiae and femoris straight, moderately broad; tarsomeres 2-4 widened, with plantar pad. Male aedeagus with straight, slightly widened above middle median lobe; inner sac with V-shaped setose pad, without sclerotized structures; phallobasal membrane non-sclerotized, short, less than 0.3 length of median lobe (Plate 76 figs 2-3).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Cautires picipennis* sp. nov. is only tentatively placed in *Cautires*, as it is quite unlike most other members of the genus in not having any sclerotized inner sac structures. It may additionally be differentiated from most congeners by the broad and somewhat widened anteriorly pronotum with short narrow median cell (Plate 76 figs 1-3).

Distribution: Known only from Madang, Papua New Guinea.

***Cautires tricoloripennis* sp. nov.** (Plate 76 figs 4-7)

Holotype ♂ ISNB: Papua New Guinea, Madang prov., Baiteta, light, 5.VI.1996, O. Missa leg.

Paratypes 173♂♂ & ♀♀ ICM & ISNB: same label as in holotype, but from 18.III.1993 to 20.V.1993; 1995; from 9.IV.1996 to 27.VII.1996; 1♂: Papua New Guinea, Madang prov., Baiteta, fogging, 16.V.1995, O. Missa leg; 1♀: Papua New Guinea, Madang prov., Baiteta, fogging, 26.V.1996, O. Missa leg.

Derivatio nominis: The name of the new species is derived from the Latin for "with tricolor wings", alluding to the coloration of its elytra.

Description: Length 7.6-10.8 mm. Width across humeri 2.0-2.7 mm.

Orange testaceous. Head, scapus and distal anten-









nomeres, pronotum anteriorly, elytral band at medial third triangularly projected towards scutellum, hind femoris and tibiae partially and abdomen dark brown to black; distal elytral third light brown. Rostrum absent. Vertex with prominent transverse and two deeper roundish impressions behind antennal prominence. Eyes relatively large, interocular distance subequal in length to eye diameter. Labrum transverse, almost truncate anteriorly, rounded at anterior angles; epistoma medially triangularly projected forward. Maxillary palps relatively long ultimate palpomere elongate, slightly widened distally, oblique at apex; labial palps slender, short, ultimate palpomere pointed and glabrous at apex. Antennal sockets separated by minute lamina. Antennae attaining to elytral two thirds, from antennomere flabellate; antennomere 3 ca. 9 times longer than antennomere 2 and ca. 1.2 times longer than antennomere 4; flabellum of antennomere 3 ca. 1.4 times shorter, flabellum of antennomere 4 ca. 1.1 times longer and flabellum of antennomere 5 subequal in length to relevant antennal stem; antennomeres 3-11 with short dense decumbent pubescence (Plate 76 fig. 4). Pronotum transverse, ca. 1.2 times as wide as long, bisinuate basally and semi-circularly projected anteriorly, with concave sides, convex before hind angles, acute posterior and rounded anterior angles; median cell narrow, extending to pronotal 0.7; lateral carinae feebly concave; anterior cells almost not diverging anteriorly, formed by concave antero-lateral carinae. Mesothoracic spiracle small, hooded; hood narrow bent backwards. Scutellum transverse, concave at sides, prominently emarginate at apex (Plate 76 fig. 4). Elytra long, ca. 3.2 times longer than wide at humeri, parallel-sided, with four strong, equally developed primary costae; interstices with double rows of regular subquadrate cells; bottom of cells glabrous; pubescence short and decumbent (Plate 76 fig. 4). Tibiae and femoris broad and straight; tarsomeres 3-4 widened, tarsomeres 1-4 with plantar pad. Male aedeagus with straight, widened distally and constricted at apex median lobe; inner sac with scissors-like structure and paired curved horns; phallobasal membrane massive, attaining to ca. 0.5 of median lobe (Plate 76 figs 5-7).

Sexual dimorphism: Female similar to male, but larger, eyes smaller, antennae serrate.

Differential diagnosis: *Cautires tricoloripennis* sp. nov. may be distinguished from congeners by the coloration and the shape of the median lobe of the aedeagus (Plate 76 figs 4-7).

Distribution: Known only from Madang, Papua New Guinea.

Malacolycus Kleine, 1943

Malacolycus Kleine, 1943: 151.

Type species: *Malacolycus paululus* Kleine, 1943: 151, by monotypy.

Notes: Only two species of this genus have so far been described (Kazantsev 2015b).

Distribution: New Guinea.

***Malacolycus gigiensis* sp. nov.** (Plate 76 figs 8-10)

Holotype ♂ NME: E Indonesia, W New Guinea, Doberai Peninsula, Arfak Mts., S of Anggi Gigi Lake, 2-2.5 km NNE vill. Uper, 01°17'10"S, 133°54'18"E, 1900-2480 m, primary mid-montane rain forest, beaten, 9.IX.2015, leg. D.Telnov.

Derivatio nominis: The name of the new species is derived from lake Anggi Gigi in the vicinity of which the type specimen was collected.

Description: Length 4.5 mm. Width across humeri 0.8 mm.

Dark brown to black. Head ventrally, pronotal margins, elytra, except at distal half and front trochanters brownish testaceous. Head subquadrate, without rostrum. Vertex with fine median keel just behind antennal prominence. Eyes small, interocular distance ca. 1.5 times greater than eye diameter, slightly incised opposite antennal sockets. Labrum small, transverse. Palps slender; ultimate palpomeres small, elongate, almost pointed distally and glabrous at apex. Antennal sockets separated by minute lamina. Antennae attaining to elytral middle, narrow; antennomeres 3-11 parallel-sided, slightly compressed; antennomere 3 ca. 4 times longer than antennomere 2 and 1.1 times longer than antennomere 4; antennomeres 3-11 with relatively long sub-erect pubescence (Plate 76 fig. 8). Pronotum transverse, ca. 1.5 times as wide as long, trapezoidal, slightly bisinuate basally and triangularly projected anteriorly, with prominent acute posterior and conspicuous blunt anterior angles; median cell weak, oval, extending to pronotal 0.7; lateral and antero-lateral carinae almost obsolete. Scutellum subquadrate, strongly narrowing distally, semi-circularly emarginate at apex (Plate 76 fig. 8). Elytra long, narrow, ca. 4.6 times longer than wide at humeri, parallel-sided, with four weak, equally developed primary costae; interstices with single rows of large irregular elongate cells; bottom of cells hairless; pubescence scarce, relative long and erect (Plate 76 fig. 8). Tibiae and femoris straight and narrow; tarsomeres narrow, with minute apical plantar pad noticeable on tarsomere 4. Male aedeagus with small, short, relatively broad, rounded at apex median lobe; inner sac with W-shaped






structure; phallobase large, nearly as long as 0.7 length of median lobe; phallobasal membrane almost obsolete (Plate 76 figs 9-10).
Sexual dimorphism: Female is unknown.
Differential diagnosis: *Malacolycus gigiensis* sp. nov. is easily separable from the congeners (*M. paululus* Kleine, 1943 and *M. lacius* Kazantsev, 2015) by the coloration and completely different shape of the aedeagus, with short and conspicuously widened distally median lobe (Plate 76 figs 8-10).
Distribution: Known only from the Arfak Mountains in Indonesian New Guinea.

***Metriorrhynchus* Gemminger, Harold, 1869**
Metriorrhynchus Gemminger, Harold, 1869: 1629.
Type species: *Lycus parallelus* Guerin-Meneville, 1838, designated by Waterhouse, 1878.

Notes: The genus *Metriorrhynchus* Gemminger, Harold, 1869 is one of the most common and speciose in New Guinea. As its concept had long been misinterpreted, even the approximate number of its species is hard to estimate (Bocák 2002). Fourteen New Guinean species were added to this genus recently (Kazantsev 2015b).
Distribution: Oriental and Australian regions (Kleine 1933; Bocák 2002).

***Metriorrhynchus cochleiformis* sp. nov.** (Plate 76 figs 11-13)
Holotype ♂ ISNB: Papua New Guinea, Madang prov., Baiteta, light, 25.VII.1996, O. Missa leg.
Paratypes 2♂ & 3♀ ICM & ISNB: same label as in holotype, dates: 26.III.1993; 19.V.1993; 20.V.1993; 7.VI.1993.

Derivatio nominis: The name of the new species is derived from the Latin for "similar to a snail", alluding to the shape of its aedeagus.
Description: Length 7.4-10.5 mm. Width across humeri 2.0-2.5 mm.
Dark brown to black. Rostrum short. Vertex with transverse impression behind antennal prominence. Eyes moderately large, interocular distance ca. 1.1 times greater than eye diameter. Labrum slightly wider than long, rounded anteriorly; epistoma broadly concave. Palps slender; ultimate palpomeres narrow, elongate, obliquely narrowed distally and glabrous apically. Antennal sockets separated by narrow lamina. Antennae attaining to elytral three fifths, from antennomere 3 serrate; antennomere 3 ca. 8 times longer than antennomere 2 and subequal in length to antennomere 4; antennomeres 3-11 with short decumbent pubescence and separate long bristling hairs (Plate 76 fig. 11). Pronotum transverse, ca. 1.3 times as wide as long, trapezoidal, with almost straight sides, slightly bisinuate basally and semi-circularly projected anteriorly, with acute posterior and blunt anterior angles; median cell narrow, attaining to pronotal 0.7; lateral carinae concave; anterior cells slightly diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle large, protruding, with small short vertical posterior hood. Scutellum transverse, slightly narrowing distally, semi-circularly emarginate at apex (Plate 76 fig. 11). Elytra long, ca. 3 times longer than wide at humeri, slightly narrowing distally, with four equally developed primary costae; interstices with double rows of small roundish cells; last interstice well visible from above, except under humerus; bottom of cells glabrous; pubescence short and decumbent (Plate 76 fig. 11). Tibiae and femoris straight; femoris broad, with long erect vestiture on inner side; tarsomeres 2-4 widened, tarsomeres 1-4 with prominent plantar pad. Male aedeagus with robust, conspicuously widened medially median lobe; inner sac with massive coiled structure deposited inside distal half of median lobe, without thorns; phallobasal membrane robust, semi-sclerotized, ca. 0.5 length of median lobe (Plate 76 figs 12-13).
Sexual dimorphism: Female similar to male, but larger, eyes somewhat smaller, femoris without long erect pubescence.
Differential diagnosis: *Metriorrhynchus cochleiformis* sp. nov. may be distinguished from the congeners by the short median pronotal cell, as well as by the robust, conspicuously widened medially median lobe of the aedeagus, with massive coiled inner sac structure (Plate 76 figs 11-13).
Distribution: Known only from Madang, Papua New Guinea.

***Metriorrhynchus uperensis* sp. nov.** (Plate 77 figs 1-3)
Holotype ♂ NME: E Indonesia, W New Guinea, Doberai Peninsula, Arfak Mts., S of Anggi Gigi Lake, env. vill. Uper, 01°18'09"S, 133°54'07"E, 1890-2100 m, primary mid-montane rainforest, 8.IX.2015, leg. D.Telnov.

Derivatio nominis: The name of the new species is derived from the locality where the type specimen was collected.
Description: Length 15.8 mm. Width across humeri 3.1 mm.
Orange testaceous. Antennae, except antennomeres 1-2 and internally antennomeres 3-4, disk






of abdominal segments and tarsi dark brown to black. Rostrum short. Vertex with roundish impression and pair of minute oblique strikes behind antennal prominence. Eyes moderately large, interocular distance subequal in length to eye diameter. Labrum elongate, rounded; epistoma broadly concave. Palps slender; ultimate palpomeres elongate, slightly widened distally and oblique apically. Antennal sockets separated by narrow lamina. Antennae attaining to elytral two thirds, from antennomere 3 strongly serrate; antennomere 3 ca. 10 times longer than antennomere 2 and subequal in length to antennomere 4; antennomeres 3-11 with short decumbent pubescence (Plate 77 fig. 1). Pronotum transverse, ca. 1.2 times as wide as long, trapezoidal, with almost straight sides, bisinuate basally and semi-circularly projected anteriorly, with prominent acute posterior and rounded anterior angles; median cell narrow, almost attaining anterior margin; lateral carinae straight, obliterate near lateral margins; anterior cells not diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle large, vertical, hooded; hood short, bent backwards. Scutellum transverse, slightly narrowing distally, rectangularly emarginate at apex (Plate 77 fig. 1). Elytra long, ca. 4.2 times longer than wide at humeri, slightly widening distally, with four equally developed primary costae; interstices with double rows of small regular, mostly transverse cells; pubescence dense, short and decumbent (Plate 77 fig. 1). Tibiae and femoris narrow, straight; tarsomeres 2-4 widened, tarsomeres 1-4 with prominent plantar pad, tarsomere 1 with plantar pad covering its entire ventral surface. Male aedeagus with narrow, slightly curved medially, slightly widening distally median lobe, with narrow, coiled, tapering apically trunk, provided with minute thorns; inner sac without thorns; phallobasal membrane semi-sclerotized, ca. 0.3 length of median lobe (Plate 77 figs 2-3).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Metriorrhynchus uperensis* sp. nov. may be easily distinguished from the congeners by the combination of coloration, antennal and pronotal structure, as well as by the narrow, curved medially, slightly widening distally median lobe, with narrow coiled and provided with minute thorns trunk, with the inner sac bearing no thorns (Plate 77 figs 1-3).

Distribution: Known only from the Arfak Mountains in Indonesian New Guinea.

***Metriorrhynchus vitiosus* sp. nov.** (Plate 77 figs 4-6)

Holotype ♂ ISNB: Papua New Guinea, Madang prov., Baiteta, light, 8.VI.1993, O. Missa leg.

Paratypes 2♂ ICM & ISNB: same label as in holotype, dates: 9.IV.1996; 30.IV.1996.

Derivatio nominis: The name of the new species is derived from the Latin for “bad, vicious”, alluding to its appearance and coloration.

Description: Length 6.8-7.2 mm. Width across humeri 1.5-1.6 mm.

Dark brown. Pronotal sides narrowly and posterior pronotal angeles, trochanters, femoris and tibiae basally testaceous. Rostrum short. Vertex with deep semi-circular impression behind antennal prominence. Eyes moderately large, bulging, interocular distance ca. 1.1 times longer than eye diameter. Labrum ca. 1.4 times wider than long, truncate anterior with rounded anterior angles; epistoma deeply concave. Palps slender; ultimate palpomeres elongate, narrow, pointed and glabrous apically. Antennal sockets separated by relatively narrow lamina. Antennae attaining to elytral middle, from antennomere 3 flabellate; antennomere 3 ca. 5 times longer than antennomere 2 and ca. 1.2 times longer than antennomere 4; flabellum of antennomere 3 ca. 2.4 times, flabellum of antennomere 4 ca. 3.6 times and flabellum of antennomere 5 ca. 3.8 times longer than relevant antennal stem; antennomeres 3-11 with short decumbent pubescence (Plate 77 fig. 4). Pronotum transverse, ca. 1.3 times as wide as long, with almost parallel and straight sides, slightly bisinuate basally and feebly triangularly projected anteriorly, with acute posterior and blunt anterior angles; median cell narrow, attaining anterior margin, very narrow in anterior fourth; lateral carinae almost straight, inconspicuous internally; anterior cells not diverging anteriorly, formed by inconspicuous straight antero-lateral carinae. Mesothoracic spiracle relatively large, oval, not hooded. Scutellum transverse, parallel-sided, semi-circularly emarginate at apex (Plate 77 fig. 4). Elytra long, ca. 3.6 times longer than wide at humeri, parallel-sided, with four equally developed primary costae; interstices with double rows of small regular, mostly elongate cells; bottom of cells hairless; pubescence short and decumbent (Plate 77 fig. 4). Tibiae and femoris narrow, straight; tarsomeres 2-4 widened, tarsomeres 1-4 with prominent plantar pad. Male aedeagus with narrow, slightly curved in distal half, slightly widening distally median lobe; inner sac with circularly arranged seven prominent thorns, without evident trunk; phallobasal mem-



brane elongate, semi-sclerotized, ca. 0.5 length of median lobe (Plate 77 figs 5-6).
Sexual dimorphism: Female is unknown.
Differential diagnosis: *Metriorrhynchus vitiosus* sp. nov. may be easily distinguished from the congeners by the combination of coloration and long antennal flabellae, as well as by the lack of evident trunk and circularly arranged prominent thorns of the inner sac of the aedeagus, with elongate and semi-sclerotized phallobasal membrane (Plate 77 figs 4-6).
Distribution: Known only from Madang, Papua New Guinea.

***Porrostoma* Laporte, 1838**
Porrostoma Laporte, 1838: 26.
Type species: *Lycus rufipennis* Fabricius, 1801, by monotypy.

Notes: The genus *Porrostoma* Laporte, 1838 is widespread in New Guinea, but is most species-rich in Australia. As it had long been considered synonymous to *Metriorrhynchus*, even the approximate number of its species is hard to estimate (Bocák 2002). Seven species from New Guinea were added to this genus recently (Kazantsev 2015b).
Distribution: Papuan and Australian regions (Kleine 1933; Bocák 2002).

***Porrostoma cautiromimum* sp. nov.** (Plate 77 figs 7-9)
Holotype ♂ ISNB: Papua New Guinea, Madang prov., Baiteta, light, 17.V.1993, O. Missa leg.
Paratypes 3♂ ICM & ISNB: same label as in holotype, dates: 4.VI.1996; 24.VII.1996; 27.VII.1996; 1♀ ISNB: Papua New Guinea, Madang prov., Baiteta, fogging, 16.V.1996, O. Missa leg.

Derivatio nominis: The name of the new species is derived from the genus name *Cautires* Waterhouse, 1879 and the Latin for "mime", alluding to its resemblance to the said genus.
Description: Length 9.1-11.0 mm. Width across humeri 2.1-3.0 mm.
Dark brown to black. Pronotum, scutellum and elytra ochre; abdomen with blue metallic tint. Rostrum moderately long. Vertex with prominent semi-circular impression behind antennal prominence. Eyes relatively small, interocular distance subequal in length to eye diameter. Labrum about as long as wide, rounded. Maxillary palps slender; ultimate palpomere elongate, slightly narrowed distally, oblique and glabrous at apex. Labial palps small; ultimate palpomere elongate, almost pointed and glabrous at apex. Antennal sockets separated by minute lamina. Antennae relatively short, hardly attaining to elytral third, from antennomere serrate; antennomere 3 ca. 5 times longer than antennomere 2 and 1.4 times longer than antennomere 4; antennomeres 3-11 with short dense sub-erect pubescence (Plate 77 fig. 7). Pronotum transverse, ca. 1.2 times as wide as long, trapezoidal, conspicuously bisinuate basally and moderately triangularly projected anteriorly, with conspicuous acute posterior and noticeable blunt anterior angles; median cell relatively narrow, extending to pronotal 0.8; lateral carinae inconspicuous near median cell, concave; anterior cells diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle prominent, slightly protruding, not hooded. Scutellum transverse, slightly narrowing distally, triangularly emarginate at apex (Plate 77 fig. 7). Elytra long, ca. 3.3 times longer than wide at humeri, slightly widening distally, with four equally developed primary costae; interstices with double rows of small regular transverse cells; bottom of cells hairless; pubescence dense, short and decumbent (Plate 77 fig. 7). Tibiae and femoris relatively broad, femoris straight, tibiae curved; tarsomeres 2-4 widened, tarsomeres 1-4 with prominent plantar pad. Male aedeagus with straight, relatively robust proximally, slightly constricted distally (in lateral view) and medially (in dorsal view) median lobe; inner sac with paired distal bulges; phallobasal membrane relatively short, attaining to 0.3 of median lobe (Plate 77 figs 8-9).
Sexual dimorphism: Female similar to male, but eyes somewhat smaller and antennae slightly less serrate.
Differential diagnosis: *Porrostoma cautiromimum* sp. nov. may be distinguished from the somewhat similar *P. echidna* Kazantsev, 2015 by the more *Cautires*-like pronotum, non-flabellate male antennae and more robust proximally median lobe of the aedeagus (Plate 77 figs 7-9).
Distribution: Known only from Madang, Papua New Guinea.

***Porrostoma exile* sp. nov.** (Plate 77 figs 10-12)
Holotype ♂ ISNB: Papua New Guinea, Madang prov., Baiteta, light, 26.III.1993, O. Missa leg.

Derivatio nominis: The name of the new species is derived from the Latin for "slender", alluding to its appearance.
Description: Length 4.4 mm. Width across humeri 1.1 mm.
Dark brown. Pronotal sides narrowly light brown.






Rostrum short. Vertex with conspicuous impression behind antennal prominence. Eyes small, interocular distance ca. 1.6 times greater than eye diameter. Labrum transverse, trapezoidal, slightly concave anteriorly; epistoma truncate. Palps slender; ultimate palpomeres elongate, almost pointed and glabrous at apex. Antennal sockets separated by broad, densely pubescent lamina. Antennae attaining to elytral two thirds, from antennomere 3 broad, feebly serrate; antennomere 3 ca. 8 times longer than antennomere 2 and subequal in length to antennomere 4; antennomeres 3-11 with short sub-erect pubescence (Plate 77 fig. 10). Pronotum transverse, ca. 1.3 times as wide as long, medially convex basally and semi-circular anteriorly, with acute pubescent posterior and blunt anterior angles; median cell narrow, its sides contiguous in posterior third and anterior fourth, almost reaching anterior margin; lateral carinae prominent, attaining to posterior angles; anterior cells diverging anteriorly, formed by straight, inconspicuous near anterior margin antero-lateral carinae. Mesothoracic spiracle minute, not hooded. Scutellum subquadrate, parallel-sided, prominently emarginate at apex (Plate 77 fig. 10). Elytra long, ca. 3.4 times longer than wide at humeri, slightly narrowing distally, with primary costa 3 conspicuously weaker in distal half; interstices 1 and 5 with double rows of small irregular roundish cells, interstice 2 with single row of cells in medial third, interstices 3 and 4 with single rows of cells in distal two thirds; bottom of cells hairless; pubescence scarce, short and decumbent (Plate 77 fig. 10). Tibiae and femoris straight, femoris moderately broad, tibiae narrow; tarsomere 4 widened, tarsomeres 1-4 with plantar pad. Male aedeagus with straight narrow median lobe, slightly curved apically in lateral view; inner sac with paired lateral coiled bulges provided with minute thorns and apical elongate bulge with minute thorns and separate long erect hairs; phallobasal membrane sclerotized, narrow, attaining to ca. 0.6 of median lobe (Plate 77 figs 11-12).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Porrostoma exile* sp. nov. may be distinguished from the congeners by the combination of coloration, elytral reticulation, broad and feebly serrate antennomeres, as well as by the straight narrow median lobe of the aedeagus and paired lateral coiled bulges with minute thorns and apical elongate bulge with minute thorns and separate long erect hairs of the inner sac and elongate sclerotised phallobasal structure (Plate 77 figs 10-12). In the elytral reticulation *P. exile* sp. nov. is quite unlike most other members of the genus, resembling only *P. mystax* sp. nov. and *Procautires multipilosus* Kazantsev, 2016, also from Baiteta, Madang, Papua New Guinea, especially in the structure of male genitalia. It is possible that these three species form a monophyletic lineage within *Porrostoma*.

Distribution: Known only from Madang, Papua New Guinea.

***Porrostoma fuscum* sp. nov.** (Plate 78 figs 1-3)

Holotype ♂ ISNB: Papua New Guinea, Madang prov., Baiteta, light, 25.VI.1993, O. Missa leg.

Paratypes 153♂ ICM & ISNB: same label as in holotype, but 31.III.1993; 22.IV.1993; 17.V.1993; 16.IV.1994; 16.IV.1995; from 9.IV.1996 to 27.VII.1996; 4♂ ISNB: Papua New Guinea, Madang prov., Baiteta, fogging, O. Missa leg; dates: 14.V.1996; 16.V.1996.

Derivatio nominis: The name of the new species is derived from the Latin for “brown”, alluding to its coloration.

Description: Length 8.6-9.5 mm. Width across humeri 1.6-2.1 mm.

Dark brown to black. Metaventrite and trochanters testaceous. Rostrum short. Vertex with prominent roundish impression and median keel behind antennal prominence. Eyes relatively large, interocular distance ca. 1.2 times shorter than eye diameter. Labrum wider than long, narrowing anteriorly, slightly emarginate medially; epistoma concave. Palps slender; ultimate palpomeres elongate, narrow, slightly narrowed distally, glabrous at apex. Antennal sockets separated by minute lamina. Antennae attaining to elytral two thirds, from antennomere flabellate; antennomere 3 ca. 5 times longer than antennomere 2 and subequal in length to antennomere 4; flabellum of antennomere 3 ca. 2.1 times, flabellum of antennomere 4 ca. 2.4 times and flabellum of antennomere 5 ca. 2.3 times longer than relevant antennal stem; antennomeres 3-11 with short scarce sub-erect pubescence (Plate 78 fig. 1). Pronotum transverse, ca. 1.25 times as wide as long, trapezoidal, bisinuate basally and moderately triangularly projected anteriorly, with slightly concave sides, conspicuous acute laterally projected posterior and noticeable blunt anterior angles; median cell narrow, extending to pronotal 0.7; lateral carinae nearly straight; anterior cells diverging anteriorly, formed by concave antero-lateral carinae. Mesothoracic spiracle prominent, slightly protruding, not hooded. Scutellum transverse, slightly narrowing distally, feebly emarginate at apex (Plate 78 fig. 1). Elytra long, ca. 3.5 times longer than wide at humeri, parallel-sided, with






four strong, equally developed primary costae; interstices with double rows of regular subquadrate cells; bottom of cells glabrous; pubescence minute and decumbent (Plate 78 fig. 1). Tibiae and femoris narrow and straight; tarsomeres 2-4 widened, tarsomeres 1-4 with prominent plantar pad. Male aedeagus with straight, narrow, widened distally median lobe; inner sac with relatively small paired distal bulges; phallobasal membrane elongate, relatively long, attaining to ca. 0.45 of median lobe (Plate 78 figs 2-3).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Porrostoma fuscum* sp. nov. may be distinguished from the morphologically similar *P. loriae* (Kleine, 1926), comb. nov. by the uniformly dark brown to black coloration and considerably more narrow median lobe of the aedeagus (Plate 78 figs 1-3).

Variation. In some paratypes the pronotal margins and carinae are testaceous.

Notes: In spite of the rather big series of males of this species (about 160 specimens), no females were found in the material.

Distribution: Known only from Madang, Papua New Guinea.

***Porrostoma gigivagum* sp. nov.** (Plate 78 figs 4-8)

Holotype ♂ NME: E Indonesia, W New Guinea, Doberai Peninsula, Arfak Mts., S of Anggi Gigi Lake, env. vill. Uper, 01°18'05"S, 133°54'24"E, 2200 m, primary mid-montane rainforest, white light, 10-11.IX.2015, leg. D.Telnov.

Derivatio nominis: The name of the new species is derived from the locality name (Anggi Gigi Lake) and the Latin for "dweller".

Description: Length 10.6 mm. Width across humeri 2.2 mm.

Dark brown to black. Pronotum and scutellum orange testaceous; elytra, except narrow apical edge, ochre. Rostrum absent. Vertex with transverse impression and fine median keel behind antennal prominence. Eyes relatively large, interocular distance subequal in length to eye diameter. Labrum transverse, rounded at anterior margins, truncate anteriorly. Palps slender; ultimate palpomeres elongate, almost parallel-sided. Antennal sockets separated by minute lamina. Antennae attaining to elytral two thirds, from antennomere 3 flabellate; antennomere 3 ca. 7 times longer than antennomere 2 and subequal in length to antennomere 4; flabellum of antennomere 3 ca. 1.1 times, flabellum of antennomere 4 ca. 1.5 times and flabellum of antennomere 5 ca. 1.4 times longer than relevant antennal stem; antennomeres 3-11 with short erect pubescence (Plate 78 fig. 4). Pronotum transverse, ca. 1.2 times as wide as long, trapezoidal, with somewhat concave sides, slightly bisinuate basally and semi-circularly projected anteriorly, with laterally projected acute posterior and noticeable blunt anterior angles; median cell narrow, extending to pronotal 0.7; lateral carinae concave; anterior cells slightly diverging anteriorly, formed by slightly curved outwardly near anterior margin antero-lateral carinae. Mesothoracic spiracle hooded; hood small, narrow, erect. Scutellum subquadrate, parallel-sided, triangularly emarginate at apex (Plate 78 fig. 4). Elytra long, ca. 3.7 times longer than wide at humeri, slightly widening distally, with four equally developed primary costae; interstices with double rows of small regular, mostly elongate cells; pubescence dense, short and decumbent (Plate 78 fig. 4). Tibiae and femoris narrow, straight; tarsomeres 2-4 widened, tarsomeres 1-4 with prominent plantar pad. Male ultimate sternite with brush of longer setae ventrally, proximally short and conspicuously widened and rounded (Plate 78 figs 5-6). Penultimate tergite single, not divided by median suture (Plate 78 fig. 6). Aedeagus with straight, gradually widening distally median lobe, distal opening occupying ca. 0.2 its length; inner sac with circular distal bulge provided with dense minute thorns; phallobasal membrane small, ca. 8 times shorter than median lobe (Plate 78 figs 7-8).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Porrostoma gigivagum* sp. nov. may be easily distinguished from the congeners by the absent rostrum, relatively long antennae and narrow proximally and gradually widening distally median lobe of the aedeagus, as well as by the inner sac with circular distal bulge provided with dense minute thorns (Plate 78 figs 4-8). It additionally differs from the somewhat similarly coloured *P. cautiromimum* sp. nov. by the absent rostrum, flabellate antennae, shape of pronotum and straight narrow tibiae.

Distribution: Known only from the Arfak Mountains in Indonesian New Guinea.

***Porrostoma loriae* (Kleine, 1926) comb. nov.**

Cladophorus loriae Kleine, 1926: 127.

Material ca. 250♂ & 2♀ ICM & ISNB: Papua New Guinea, Madang prov., Baiteta, light, O. Missa leg, dates: 18.III.1993 to 19.V.1993; from 23.IV.1995 to 2.VII.1995; from 9.IV.1996 to 27.VII.1996; 2♂: Papua New Guinea, Madang prov., Baiteta, fogging, O. Missa leg; dates: 14.V.1996; 16.V.1996.






Notes: The description of *Cladophorus loriae* Kleine, 1926, supplemented with an illustration (Kleine, 1926), demonstrates that the species does not belong in *Cladophorus*, but rather in *Porrostoma*, according to the rectified concept of the two genera (Bocák 2002). Hence, the taxon is transferred to *Porrostoma* as *Porrostoma loriae* (Kleine, 1926) comb. nov.
Distribution: Paumomu River, New Guinea (Kleine 1926); Madang, Papua New Guinea.

***Porrostoma mutum* sp. nov.** (Plate 78 figs 9-11)
Holotype ♂ ISNB: Papua New Guinea, Madang prov., Baiteta, light, V.1993, O. Missa leg.
Paratypes 2♂ ICM & ISNB: Papua New Guinea, Madang prov., Baiteta, fogging, 8.VI.1994, O. Missa leg.; Papua New Guinea, Madang prov., Baiteta, light, 30.V.1996, O. Missa leg.

Derivatio nominis: The name of the new species is derived from the Latin for "dumb", alluding to its appearance.
Description: Length 6.0-6.3 mm. Width across humeri 1.35-1.40 mm.
Dark brown. Head dorsally black; antennomeres 1-2, frons and pronotal sides light brown. Rostrum short. Vertex with deep semi-circular impression behind antennal prominence. Eyes small, interocular distance ca. 1.7 times greater than eye diameter. Labrum about as long as wide, rounded. Maxillary palps slender; ultimate palpomere elongate, oblique and glabrous at apex. Labial palps small; ultimate palpomere elongate, pointed and glabrous at apex. Antennal sockets separated by relatively broad lamina. Antennae attaining to elytral three fifths, from antennomere 3 flabellate; antennomere 3 ca. 5 times longer than antennomere 2 and 1.2 times longer than antennomere 4; flabellum of antennomere 3 ca. 2.7 times, flabellum of antennomere 4 ca. 4.2 times and flabellum of antennomere 5 ca. 3.7 times longer than relevant antennal stem; antennomeres 3-11 with short decumbent pubescence (Plate 78 fig. 9). Pronotum transverse, ca. 1.2 times as wide as long, parallel-sided, almost straight basally and semi-circular anteriorly, with straight posterior and rounded anterior angles; median cell obscure, extending to pronotal 0.6; lateral carinae broad, oblique, obscure near median cell; anterior cells not diverging anteriorly, formed by broad, straight, obliterate in anterior half antero-lateral carinae. Mesothoracic spiracle prominent, slightly protruding, not hooded. Scutellum transverse, rounded, semi-circularly emarginate at apex (Plate 78 fig. 9). Elytra long, ca. 3.4 times longer than wide at humeri, parallel-sided, with four equally developed primary costae; interstices with double rows of small irregular subquadrate cells; bottom of cells hairless; pubescence scarce, short and decumbent (Plate 78 fig. 9). Tibiae and femoris straight, femoris moderately broad, tibiae narrow; tarsomeres 2-4 widened, with plantar pad (tarsomere 1 with apical plantar pad). Male aedeagus with narrow proximally, gradually widened distally median lobe; in lateral view median lobe bent in distal half semi-circularly widened apically; inner sac with paired distal and single proximal bulges provided with series of thorns; phallobasal membrane semi-sclerotized, narrow, attaining to ca. 0.6 of median lobe (Plate 64 figs 10-11).
Sexual dimorphism: Female is unknown.
Differential diagnosis: *Porrostoma mutum* sp. nov. may be distinguished from the congeners by the combination of coloration, long flabellae of male median antennomeres, long curved median lobe of the aedeagus and paired distal inner sac bulges with series of thorns (Plate 78 figs 9-11).
Distribution: Known only from Madang, Papua New Guinea.

***Porrostoma mystax* sp. nov.** (Plate 79 figs 1-3)
Holotype ♂ ISNB: Papua New Guinea, Madang prov., Baiteta, light, 18.VII.1996, O. Missa leg.
Paratypes 2♂ ICM & ISNB: Papua New Guinea, Madang prov., Baiteta, fogging, 1.V.1996, O. Missa leg.

Derivatio nominis: The name of the new species is derived from the Old Greek for "moustache", alluding to its relatively long inner sac whiskers.
Description: Length 5.2-6.2 mm. Width across humeri 1.2-1.5 mm.
Dark brown to black; frons, pronotal sides and trochanters light brown. Vertex with deep transverse excavation behind antennal prominence. Eyes relatively small, interocular distance ca. 1.5 times greater than eye diameter. Labrum elongate, semi-oval. Palps slender; ultimate palpomeres elongate, pointed and glabrous at apex. Antennal sockets separated by narrow lamina. Antennae attaining to elytral two thirds, from antennomere 3 feebly dentate; antennomere 3 ca. 6 times longer than antennomere 2 and 1.15 times longer than antennomere 4; antennomeres 3-11 with short decumbent pubescence and longer pre-apical and apical bristles (Plate 79 fig. 1). Pronotum transverse, ca. 1.2 times as wide as long, with almost straight sides, almost straight basally and triangularly projected anteriorly, with acute posterior and conspicuous blunt anterior angles; median cell narrow, extending to ante-






rior margin; lateral carinae slightly convex; anterior cells slightly diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle small, short, not hooded. Scutellum subquadrate, parallel-sided, deeply emarginate at apex (Plate 79 fig. 1). Elytra long, ca. 3.8 times longer than wide at humeri, parallel-sided, with four equally developed primary costae; interstices 1-2 with one row of cells in third fourth; interstices 3-4 with double rows of cells only at proximal fifths; dense pubescence short and decumbent (Plate 79 fig. 1). Tibiae and femoris straight, narrow; tarsomeres 3-4 widened, with complete plantar pad (tarsomeres 1-2 with minute apical plantar pad). Male aedeagus with narrow, slightly bent in lateral view median lobe; inner sac with conspicuous lateral teeth and long whiskers; phallobase with elongate, fully sclerotised parameres-like process, semi-enveloping median lobe and constituting ca. 0.6 length of median lobe (Plate 79 figs 2-3).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Porrostoma mystax* sp. nov. can be separated from the habitually similar *P. exile* sp. nov. by the long, narrow, slightly bent in lateral view median lobe of the aedeagus, with long inner sac whiskers (Plate 79 figs 2-3). By the shape of the aedeagus the new species also resembles *Procautires multipilosus* Kazantsev, 2016, differing by the slenderer body, more transverse pronotum, as well as by the conspicuously less pilose and noticeably bent median lobe of the aedeagus.

Distribution: Known only from Madang, Papua New Guinea.

***Porrostoma semiflavum* sp. nov.** (Plate 79 figs 4-6)

Holotype ♂ NME: E Indonesia, Irian Jaya, 35 km S Nabire, Topo Bumi R., 150 m, 13.I.1996, A. Weigel leg.

Paratypes 2♂ ICM & NME: E Indonesia, Irian Jaya, 50 km S Nabire, Ilaga Road, Station Pusppenssat, 300 m, 03°29.5'S, 135°43.8'E, VIII-IX.1991, P. Hoyes leg.; E Indonesia, Irian Jaya, 50 km S Nabire, Pusppenssat, 750 m, 31.XII.1997, A. Weigel leg.

Derivatio nominis: The name of the new species is derived from the Latin for "half yellow", alluding to its coloration.

Description: Length 11.0-12.8 mm. Width across humeri 2.8-2.9 mm.

Dark brown to black. Antennomere 1 proximally, antennomere 2, pronotal disk, elytral proximal fifth, scutellum distally, ventrum, trochanters, tibiae proximally and internally testaceous. Rostrum short. Vertex with prominent transverse oval impression behind antennal prominence. Eyes moderately large, interocular distance subequal in length to eye diameter. Labrum transverse, rounded anteriorly; epistoma concave. Palps slender; ultimate palpomeres elongate, narrow, narrowed distally, glabrous at apex. Antennal sockets separated by minute lamina. Antennae attaining to elytral two thirds, from antennomere flabellate; antennomere 3 ca. 12 times longer than antennomere 2 and ca. 1.4 times longer than antennomere 4; flabellum of antennomere 3 ca. 1.1 times, flabellum of antennomere 4 ca. 1.7 times and flabellum of antennomere 5 ca. 1.6 times longer than relevant antennal stem; antennomeres 3-11 with short dense decumbent pubescence (Plate 79 fig. 4). Pronotum transverse, ca. 1.3 times as wide as long, noticeably narrowing anteriorly, bisinuate basally and moderately semicircularly projected anteriorly, with convex sides, minute pointed posterior and noticeable blunt anterior angles; median cell narrow, extending ca. to pronotal 0.75; lateral carinae curved; anterior cells diverging anteriorly, formed by outwardly curved antero-lateral carinae. Mesothoracic spiracle prominent, slightly protruding, not hooded. Scutellum transverse, narrowing distally, triangularly emarginate at apex (Plate 79 fig. 4). Elytra long, ca. 3 times longer than wide at humeri, slightly widening distally, with four strong, equally developed primary costae; interstices with double rows of regular mostly transverse rectangular cells; bottom of cells glabrous; pubescence minute and decumbent (Plate 79 fig. 4). Tibiae and femoris straight, femoris relatively broad, tibiae narrow; tarsomeres 2-4 widened, plantar pad on tarsomeres 1-4, in tarsomere 1 occupying ca. half its length. Male aedeagus with straight, narrow, slightly widened distally median lobe; inner sac with paired lateral and vertical distal bulges; phallobasal membrane elongate, oval, attaining to ca. 0.4 of median lobe (Plate 79 figs 5-6).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Porrostoma semiflavum* sp. nov. may be distinguished from the morphologically similar *P. loriae* (Kleine, 1926), comb. nov. and *P. fuscum* sp. nov. by the coloration, convex pronotal sides, pointed posterior pronotal angles and shorter antennal flabellae, as well as by the only slightly widened distally median lobe of the aedeagus with more prominent inner sac bulges (Plate 79 figs 4-6).

Variation. In one of the paratypes the pronotum is entirely testaceous and only half of elytra is black.

Distribution: Known only from Irian Jaya, Indonesian New Guinea.






***Procautires* Kleine, 1925**

Procautires Kleine, 1925: 32.

Type species: *P. toxopei* Kleine, 1925: 32, by monotypy.

Notes: The genus *Procautires* Kleine, 1925 is one of the endemics of the Australian and Papuan regions. Twenty seven species of this genus have so far been known, with twenty six recorded in New Guinea and on the adjacent islands (Kleine 1926; 1933; 1935; Bocák 2002; Kazantsev 2016a).

***Procautires cirratus* sp. nov.** (Plate 79 figs 7-9)

Holotype ♂ ICM: Papua New Guinea, 10 km N Madang, 2 km NNW Riwo, 9-11.II.1989, M. & R. Holyński leg.

Derivatio nominis: The name of the new species is derived from the Latin for "curly-haired", alluding to its inner sac cirri.

Description: Length 4.5 mm. Width across humeri 1.0 mm.

Uniformly dark brown to black. Vertex with two small deep oblique impressions behind antennal prominence. Eyes small, interocular distance ca. 1.7 times greater than eye diameter. Labrum small, transverse, rounded anteriorly. Palps slender; ultimate palpomeres elongate, pointed and glabrous at apex. Antennal sockets separated by narrow lamina. Antennae attaining to elytral three fourths, from antennomere 3 dentate; antennomere 3 ca. 6 times longer than antennomere 2 and 1.1 times shorter than antennomere 4; antennomeres 3-11 with relatively long sub-erect pubescence (Plate 79 fig. 7). Pronotum transverse, ca. 1.2 times as wide as long, with almost straight sides, slightly concave before posterior angles, bisinuate basally and convex anteriorly, with acute posterior and inconspicuous blunt anterior angles; median cell relatively narrow, extending to 0.75 pronotal length; lateral carinae slightly convex; anterior cells slightly diverging anteriorly, formed by straight and narrow antero-lateral carinae. Mesothoracic spiracle small, short, not hooded. Scutellum transverse, parallel-sided, deeply and broadly emarginate at apex (Plate 79 fig. 7). Elytra long and narrow, ca. 3.75 times longer than wide at humeri, almost parallel-sided, only slightly concave in the middle, with four equally developed primary costae; interstices 1 and 5 with double rows of irregular subquadrate cells; interstice 2 with double rows of cells only at proximal and distal fifths; interstices 3-4 with double rows of cells only at proximal fifths; bottom of cells hairless, glabrous; pubescence short and semi-erect (Plate 79 fig. 7). Tibiae and femoris straight, narrow; tarsomeres 3-4 widened, with complete plantar pad. Male aedeagus with narrow, only slightly widened before apex median lobe, with apparent inner sac cirri (Plate 79 figs 8-9).

Sexual dimorphism: Female is unknown.

Differential diagnosis: *Procautires cirratus* sp. nov. resembles *P. aflabellatus* Kazantsev, 2016, but is easily separable by the slenderer body, smaller eyes, as well as by the narrow, only slightly widened before apex median lobe of the aedeagus, with apparent inner sac cirri (whiskers) (Plate 79 figs 7-9).

Distribution: Known only from Madang, Papua New Guinea.

***Procautires fuscicolor* sp. nov.** (Plate 79 figs 10-12)

Holotype ♂ ISNB: Papua New Guinea, Madang prov., Baiteta, light, 26.VI.1996, O. Missa leg.

Derivatio nominis: The name of the new species is derived from the Latin for "dark" and "colour", alluding to its coloration.

Description: Length 5.3 mm. Width across humeri 1.2 mm.

Uniformly dark brown to black. Vertex with transverse groove and two small deep round impressions behind antennal prominence. Eyes moderately large, interocular distance ca. 1.2 times greater than eye diameter. Labrum short, transverse, rounded anteriorly. Palps slender; ultimate palpomeres elongate, greatly narrowed, flattened and glabrous at apex. Antennal sockets separated by minute lamina. Antennae almost attaining to elytral five sixths, from antennomere 3 dentate; antennomere 3 ca. 7 times longer than antennomere 2 and ca. 1.15 times shorter than antennomere 4; antennomeres 3-11 with short decumbent pubescence (Plate 79 fig. 10). Pronotum transverse, ca. 1.3 times as wide as long, slightly narrowing distally, concave before posterior angles, slightly bisinuate basally and noticeably projected anteriorly, with acute posterior and conspicuous blunt anterior angles; median cell relatively broad, extending to 0.65 pronotal length; lateral carinae slightly convex; anterior cells broad, diverging anteriorly, formed by straight antero-lateral carinae. Mesothoracic spiracle small, short, not hooded. Scutellum about as long as wide, trapezoidal, semicircularly emarginate at apex (Plate 79 fig. 10). Elytra long, ca. 3.5 times longer than wide at humeri, parallel-sided, with four equally developed primary costae; interstices 1 and 5 with double rows of irregular subquadrate cells at proximal; interstices 2-3 with single row of cells in the middle fourth; pubescence short and decumbent (Plate





79 fig. 10). Tibiae and femoris straight, narrow, subequal in length; tarsomeres 3-4 widened, with complete plantar pad (tarsomeres 1-2 with apical plantar pad). Male aedeagus with straight, almost parallel-sided, but noticeably widened before apex median lobe (Plate 79 figs 11-12).

Sexual dimorphism: Female is unknown.

Differential diagnosis: As the previous species, *Procautires fuscicolor* sp. nov. also resembles *P. aflabellatus* Kazantsev, 2016, separable by the more dentate antennae, smaller eyes, wider and shorter median pronotal cell, as well as by the noticeably widened before apex median lobe of the aedeagus (Plate 79 figs 10-12).

Distribution: Known only from Madang, Papua New Guinea.

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New sap beetles of the subfamily Epuraeinae (Coleoptera: Nitidulidae) from Indonesian New Guinea and taxonomic notes

ALEXANDER G. KIREJTSHUK

Zoological Institute of the Russian Academy of Sciences, Universitetskaya emb. 1, 199034, St. Petersburg, Russia; e-mail: agk@mail.ru, kirejtshuk@gmail.com *and* UMR 7205 – Muséum national d'Histoire naturelle, Sorbonne Universités, 57 rue Cuvier, CP 50, Entomologie, F-75005, Paris, France

Abstract: In the paper West Papuan *Epuraea* (*Haptoncus*) *telnovi* sp. nov., *Amystrops* (*Amystrops*) *solitaria* sp. nov. and *Carpocryraea gratiosa* sp. nov. from Arfak Mountains (Doberai Peninsula), and also *Trimenus* (*Schawalleria* gen. nov.) *plicatus* sp. nov. from Jayawijaya Mountains are described. An annotated list of species of the genus *Amystrops* Grouvelle, 1906, notes on synonymy of the genera *Carpocryraea* Kirejtshuk, 1998 and *Csiromenus* Kirejtshuk et Kvamme, 2001, position of "*Amystrops bakeri* Grouvelle, 1914" [junior synonym of *Epuraea* (*Epuraea*) *latissima* Reitter, 1880)], "*Amystrops camptoides* Grouvelle, 1916" [*Epuraea* (*Haptoncus*) *camptoides* comb. nov.], "*Aphenolia bakeri* Grouvelle, 1914" [*Trimenus* (*Trimenus*) *bakeri* comb. nov.] are given. The lectotypes of *Amystrops* (*Amystrops*) *diluta* (Grouvelle, 1906a: 201) comb. nov., *A.* (*A.*) *dubia* (Grouvelle, 1903: 173) comb. nov., *A.* (*A.*) *punctata* Grouvelle, 1906 and *Epuraea* (*Epuraea*) *bakeri* Grouvelle, 1914 are designated.

Key words: New subgenus, new species, Epuraeini, Taenioncini, West Papua Province, type designation

Introduction

The nitidulid fauna of the West Papuan Province of Indonesia (formerly also known as West Irian Jaya or Irian Jaya Barat) is very rich and includes many endemic groups and species most of which still remain undescribed. The author studied many specimens from some collections where materials from this area are deposited and found much more than hundreds of new species presumably mostly endemic. Among them there are many species of the groups representing also some undescribed genera mainly from the subfamily Cillaeinae Kirejtshuk et Audisio, 1986 and many new species from the subfamilies Epuraeinae Kirejtshuk, 1986 and Cillaeinae. This paper aims to introduce four new species from different epuraeine genera important for understanding of structure and range of each genus, and also make some important taxonomic notes on epuraeines of the Indo-Malayan and Australian fauna.

Materials and methods

The specimens of three new species under description originated from Doberai (= Bird's Head) Peninsula collected by D. Telnov and deposited in the Zoological Institute of the Russian Academy of Sciences, St. Petersburg (ZIN) and one new species originated from Jayawijaya Mountains (between Theila and Habema) collected by A. Riedel and deposited in the Staatliches Museum f*ür* Naturkunde in Stuttgart (SMNS) and partly in ZIN. Besides, some type series and other materials for this paper were obtained from the collection of Natural History Museum, London (BMNH), Deutsches Entomologisches Institut (DEI), Field Museum of Natural History, Chicago (FMNH), Institut royal des Sciences naturelles in Bruxelles (IRSN), Museo Civico di Storia Naturale Giacomo Doria, Genova (MSNG), Muséum national d'Histoire naturelle in Paris (MNHN), and Zoologisches Museum der Humboldt-Universität zu Berlin (ZMB). The studies were carried out with usage of usual optical devices and the photographs were taken with a Canon EOS 11 40D digital camera with a Canon MP-E 65 mm objective and combined using Zerene Stacker 1.04 software.






Taxonomic part
Coleoptera
Nitidulidae Latreille, 1802
Epuraeinae Kirejtshuk, 1986
Epuraeini Kirejtshuk, 1986

Genus *Epuraea* Erichson, 1843
Type species: *Nitidula decemguttata* Fabricius 1792, non Olivier, 1790

Subgenus *Haptoncus* Murray, 1864
Type species: *Haptoncus tetragonus* Murray, 1864

***Epuraea (Haptoncus) telnovi* sp. nov.** (Plate 80 figs 1-6)
Holotype ♂ ZIN: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, Syoubri vill., 1°06'40S, 133°54'36"E, 1510 m, edge of secondary lower montane rainforest, 12-13.IX.2015, white light, leg. D.Telnov.
Paratypes 2♀ ZIN: same label as in holotype.

Derivatio nominis: Patronymic. The epithet of this new species is devoted to the collector of the type specimens, Dmitry Telnov.
Description of male (holotype): Length 3.7, width 2.1, height 0.8 mm. Oval, slightly convex dorsally and ventrally; dorsum straw reddish with somewhat darker head, prosternum, meso- and metaventrites and blackish infuscations on upper surface of head, median part of pronotum and unclear paramedian stripes of small infuscations on elytra; dorsum and underside with slight shine; dorsum with moderately conspicuous, short and sparse, subrecumbent yellowish hairs, about as long as distance between their insertions; pygidium with shorter and sparser hairs; underside with somewhat finer, longer and sparser hairs. Head and pronotum with distinct punctures, about as large as eye facets, interspaces between them about as great as one puncture diameter or somewhat greater (particularly on pronotum), slightly and finely alutaceous. Elytra with punctures shallower and smaller than those on head and pronotum, interspaces between them much greater than those on head and pronotum, slightly and finely alutaceous. Pygidium with finer and denser punctures, slightly and finely alutaceous to microreticulate. Prosternum, prohypomera, meso- and metaventrites very sparsely, shallowly and finely punctured and with finely alutaceous interspaces. Other sclerites of underside with shallow and fine punctures (on abdomen becoming denser and slightly coarser distally), intervals between them alutaceous to finely and densely microreticulated. Head markedly shorter than distance between eyes, subflattened, with temples not projecting externally behind eyes. Antennae nearly as long as head wide; scape of usual shape, somewhat longer than wide; antennomeres 2 and 3 subequal in length, following flagellomeres gradually becoming shorter; club nearly twice as long as wide, composing more than third of total antennal length. Labrum with rather short obliquely truncate lobes, nearly third as long as wide and with short median excision. Pronotum slightly and evenly convex on disc, gently and evenly sloping to extremely widely explanate sides (as widely explanate as antennal club wide), broadly arcuate at sides and widest at basal third, with broadly rounded posterior and anterior angles, anterior edge trapezium-shapedly emarginate and posterior one shallowly bi-emarginate. Scutellum strongly transverse, subtriangular, with angular apex. Elytra strongly widened, widest at midlength, somewhat shorter than combined width and leaving pygidium completely uncovered, with rather gently sloping to sides (as widely explanate as pronotal ones) and with transversely broadly rounded to subtruncate apices. Pygidium subtruncate at apex, from under it subangular apex of anal sclerite moderately exposed. Mentum twice as wide as long, subhexagonal, with rounded sides and excavate anterior edge. Ultimate labial palpomere cup-shaped, about one and third as wide as long. Ultimate maxillary palpomere almost four times as long as wide, subconical. Antennal grooves with distinct both inner and outer edges and rectilinearly convergent and transversely joined posteriorly; postocular fossae not expressed. Prosternal process strongly curved along coxae and subparallel-sided before sharply widened apex with broadly arcuate posterior edge, apex somewhat wider than antennal club. Distance between mesocoxae subequal to and that between metacoxae more than twice as wide as that between procoxae. Mesoventrite without carina. Metaventrite subflattened before emarginate posterior edge between coxae. Abdominal ventrite 1 about as long as hypopygidium, Hypopygidium with widely subtruncate to bi-emarginate apex. Epipleura about 2.5 times as wide as antennal club, subhorizontal. Tibiae subequal in width, somewhat narrower than antennal club. Femora of usual shape, about three times as wide as corresponding tibiae, metafemora with convex anterior and posterior edges. Protarsus about half as wide as antennal club and slightly wider than 2/3 of tibiae, meso- and metatarsi markedly narrower, claws rather long and simple. Tegmen and penis trunk very weakly sclerotized.






Penis trunk fused with its basal apodeme.
Sexual dimorphism: Female differs from male in smaller and narrower body (with length 2.7-2.9, width 1.6 mm), more broadly arcuate and more narrowly explanate pronotal and elytral sides, narrower tarsi, widely rounded apex of pygidium and hypopygidium.
Variability: Length 2.7-3.7 mm. The paratypes are subunicolorous yellowish reddish with dark head. Some variability is observed in puncturation.
Differential diagnosis: This new species is very distinct from all subcongeners in its very wide body, arcuate and very widely explanate sides of pronotum and elytra, particularly in the male, and also comparatively long legs. The body infuscations are somewhat similar to those in the Papuan-Australian *Epuraea* (*Haptoncus*) *literata* (Reitter, 1880), although it differs from the latter in its oval body with very widely explanate pronotal and elytral sides, and also in the pattern of dorsal infuscations, temples not projecting externally behind eyes. From other subcongeners with dark and blackish infuscations on dorsum (having, however, another pattern of infuscations) and almost all other members of *Haptoncus* the new species differs also in the more oval, subflattened and larger body with widely explanate pronotal and elytral sides, comparatively smaller eyes, although the ultimate labial palpomeres and structure of the main aedeagal sclerites (penis trunk and tegmen) of *Epuraea* (*Haptoncus*) *telnovi* sp. nov. are similar to those in the group of species formerly considered in the taxon *Haptoncurina* Jelínek, 1977 rather than those in the representatives of *Haptoncus* sensu Jelínek, 1977, while the body shape of the new species can be compared with some members of *Haptoncus* sensu Jelínek, 1977 (not Murray, 1864), but not *Haptoncurina*. The only species which can be compared with the new species is the Polynesian *Epuraea* (*Haptoncus*) *takhtajani* G.Medvedev et Ter-Minasyan, 1973, which is highly variable and somewhat larger its representatives looking somewhat similar to those of *Epuraea* (*Haptoncus*) *telnovi* sp. nov. Nevertheless the latter differs from the first in the more oval, subflattened and rather shining body with very widely explanate pronotal and elytral sides, smaller eyes and more transverse ultimate labial palpomere.

Genus *Amystrops* Grouvelle, 1906
Type species: *Amystrops modiglianii* Grouvelle, 1906

Subgenus *Amystrops* Grouvelle, 1906

Notes on variability of the species of genus *Amystrops:* This genus demonstrates a wide range of variability of many structures between different congeners as well as within the same species (particularly in *Amystrops* (*Amystrops*) *nigripennis* (Redtenbacher, 1867), **comb. nov.**) which was a reason for the proposal of many specific and generic synonyms, while the genital structures of both sex are much less variable. A special variability is observed in body size and outlines of body sclerites, mandibles, antennae and prosternal process (Gillogly 1962; Kirejtshuk 1997 etc.) and this circumstance was a reason for proposals of different generic and species names for the same species (Kirejtshuk 1998). At the same time these variable structural peculiarities gave the main diagnostic characters of the genus (Kirejtshuk, 1998). Somehow such a pattern of variability shows many parallelisms in other anthophagous nitidulids, namely in the Central and South American genus *Mystrops* (Mystropini Murray, 1864 within Nitidulinae s. str.) and Afro-Asian genera *Pria* Stephens, 1829, *Cryptarchopria* Jelínek, 1975 etc. (Meligethinae Thomson, 1859) (Endrödy-Younga 1978; Kirejtshuk & Couturier 2010 etc.). In all these groups these parallel structural transformations seem to be to a considerable degree an expression of allometric growth. Most members of this genus available in different collections remain undescrided and, therefore, it is rather probable that some synonyms of these subgeneric names (see also the remarks in the below taxonomic notes) will be used for further designation of its distinct groups.

***Amystrops (Amystrops) solitaria* sp. nov.** (Plate 80 figs 7-11)
Holotype ♂ ZIN: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, Syoubri vill., 1°06'40S, 133°54'36"E, 1510 m, edge of secondary lower montane rainforest, 12-13.IX.2015, white light, leg. D.Telnov.
Derivatio nominis: The epithet of this new species refers to the presentation of this species available for the current study.
Description: Length 2.8, width 1.3, height 0.5 mm. Elongate oval, moderately convex dorsally and slightly ventrally; dorsum reddish with darker antennal clubs and some infuscations on dorsum (head, scutellum, three longitudinal stripes on pronotum and unclear spots on elytral distal two thirds); dorsum and underside with slight shine; dorsum with rather conspicuous, short and sparse, subrecum-



bent yellowish grey hairs, about as long as distance between their insertions; pygidium with shorter hairs; underside with hairs as long as on head, pronotum and elytra, but very fine and less conspicuous. Head and pronotum with distinct punctures, about as large as eye facets, interspaces between them about as great as one puncture diameter or somewhat greater, slightly alutaceous. Elytra with similar punctures, very narrow interspaces between them somewhat greater. Pygidium with finer punctures than those on pronotum and elytra. Prosternum, prohypomera and mesoventrite very sparsely, shallowly and finely punctured and with finely alutaceous interspaces. Other sclerites of underside with shallow and fine punctures (becoming slightly coarser distally), interspaces between them alutaceous to finely and densely microreticulated. Head markedly shorter than distance between eyes, subflattened, with raised temples somewhat angularly projecting externally behind eyes. Antennae slightly longer than head width; scape of usual shape, somewhat longer than wide; antennomeres 2 and 3 subequal in length, following flagellomeres gradually becoming shorter; club about twice as long as wide, comprising nearly third of total antennal length. Labrum nearly two thirds as long as longitudinal diameter of eye, comparatively wide lobes of labrum moderately far projecting anteriorly and with oblique apices. Mandibles moderately large with strongly elevated outer edge and bidentate apex, although inner apical tooth rather smaller than outer one. Pronotum slightly and evenly convex on disc and evenly sloping to moderately widely explanate sides (as widely explanate as antennal flagella wide), arcuate at sides, with narrowly rounded posterior and broadly rounded anterior angles, anterior edge very shallowly emarginate and posterior one almost straight and slightly sinuate at each posterior angle. Scutellum slightly transverse, subtriangular, with angular apex. Elytra slightly shorter than combined width and leaving pygidium and apex of previous segment uncovered, with moderately steeply sloping to sides (as widely explanate as pronotal ones) and with transversely broadly rounded to subtruncate apices. Pygidium subtruncate at apex, from under it apex of anal sclerite moderately exposed. Mentum about 2.5 times as wide as long, subhexagonal, with rounded sides and emarginate anterior edge. Ultimate labial palpomere slightly longer than wide and nearly cup-shaped. Ultimate maxillary palpomere almost four times as long as wide, subconical. Antennal grooves with distinct both inner and outer edges and rectilinearly convergent and with minimal distance slightly less than width of antennal club; postocular fossae unexpressed. Prosternal process strongly curved along coxae before subtransverse apex, apex about 1.5 times as wide as antennal club. Distance between mesocoxae subequal to and that between metacoxae twice as wide as that between procoxae. Mesoventrite without carina. Metaventrite subflattened before subangular posterior edge between coxae. Abdominal ventrite 1 about as long as hypopygidium, Hypopygidium with widely subtruncate apex. Epipleura about 1.5 times as wide as antennal club, weakly elevated laterally. Tibiae subequal in width, somewhat wider than antennal club. Femora of usual shape, pro- and mesofemora about 2.5 times as wide as corresponding tibiae; metafemur nearly three times as wide as corresponding tibia, with convex anterior and posterior edges. Protarsus about half as wide as antennal club and slightly wider than two thirds of tibiae, meso- and metatarsi markedly narrower, claws rather long and simple.

Tegmen moderately and penis trunk well sclerotized. Penis trunk fused with its basal apodeme.

Sexual dimorphism: Female unknown.

Differential diagnosis: This new species is characterized by its widely explanate pronotal and elytral sides, comparatively long and narrow tibiae, temples somewhat angularly projecting externally behind eyes, mandibles with strongly elevated outer edge and bidentate apices. These bidentate apices of *Amystrops* (*Amystrops*) *solitaria* sp. nov. have the inner apical tooth oriented obliquely distally, while in most other cases if the inner apical tooth is raised it is oriented nearly perpendicularly to inner edge of mandibles. The inner apical tooth similar to that in the new species is also known in *A.* (*A.*) *brittoni* (Kirejtshuk, 1986) **comb. nov.** from North and East Australia, *Amystrops* (*Amystrops*) *minuta* (Gillogly, 1962) **comb. nov.** and *A.* (*A.*) *reticulata* (Gillogly, 1962) **comb. nov.** from Micronesia, *A.* (*A.*) *modiglianii* (Grouvelle, 1906) from Mentawai Islands near Sumatra and *A.* (*A.*) *novaguineensis* (Kirejtshuk, 1990) **comb. nov.** from New Guinea. *Amystrops* (*Amystrops*) *solitaria* sp. nov. differs from another Papuan species, *A.* (*A.*) *novaguineensis* comb. nov., in the wider and less convex body with very short and recumbent pubescence in male, somewhat shorter antennae, temples somewhat angularly projecting externally behind eyes, indistinct top of posterior angles of pronotum, shape of mentum and widely rounded to subtruncate apex of anal sclerite. Besides, *Amystrops* (*Amystrops*) *solitaria* differs from:

A. (*A.*) *brittoni* in the oval and somewhat darker






body, gently and evenly convex dorsum, comparatively narrower head, explanate sides of pronotum and elytra, shorter pubescence, temples somewhat angularly projecting externally behind eyes, less elongate club, and another structure aedeagus;
A. (*A.*) *minuta* and *A.* (*A.*) *reticulata* (based on its original description: Gillogly, 1962: 161) in the oval and somewhat unicolored body, gently and evenly convex dorsum, comparatively narrower head, explanate sides of pronotum and elytra, shorter pubescence, temples somewhat angularly projecting externally behind eyes, longer and narrower tibiae; and from *A.* (*A.*) *minuta* also in the not widely rounded posterior pronotal angles;
A. (*A.*) *modiglianii* in the oval and darker body, gently and evenly convex dorsum, comparatively narrower head, wider male mandibles with much shorter inner apical tooth, explanate sides of pronotum and elytra, not evenly emarginate posterior edge of pronotum, much more conspicuous pubescence, temples somewhat angularly projecting externally behind eyes, longer and narrower tibiae.
A. (*A.*) *aquila* (Kirejtshuk, 1997) **comb. nov.** from Mindanao (Philippines) in the smaller, lighter and less convex body with narrower pronotum, denser and finer dorsal puncturation, narrow and longer labral lobes, shorter male mandibles, temples somewhat angularly projecting behind eyes, much shorter male antennae with less elongate club, tergite VI not exposed from under elytra and structure of tegmen;
A. (*A.*) *diluta* (Grouvelle, 1906) **comb. nov.** from North and East Australia *A.* (*A.*) *dubia* (Grouvelle, 1903) **comb. nov.** from New Caledonia in the oval and somewhat darker body, gently and evenly convex dorsum, explanate sides of pronotum and elytra, much shorter pubescence, temples somewhat angularly projecting behind eyes, more or less shorter male antennae with less elongate club, longer and narrower tibiae, subtransverse apex of male anal sclerite and structure aedeagus;
A. (*A.*) *monticola* Grouvelle, 1917 from Luzon (Philippines) in the oval and darker body, gently and evenly convex dorsum, comparatively narrower head, wider male mandibles, explanate sides of pronotum and elytra, only slightly projecting posterior pronotal angles, much shorter conspicuous pubescence, temples somewhat angularly projecting externally behind eyes, longer and narrower tibiae.
A. (*A.*) *nigripennis* (Redtenbacher, 1867) **comb. nov.** spread in many areas of the Indo-Malayan Region in the much shorter pubescence, temples somewhat angularly projecting externally behind eyes, clearly explanate pronotal and elytral sides, subtransverse apex of male anal sclerite and structure of main sclerites of aedeagus;
A. (*A.*) *nitida* (Gillogly, 1962) **comb. nov.** and *A.* (*A.*) *pacifica* (Gillogly, 1962) **comb. nov.** from Micronesia, and also *A.* (*A.*) *puberula* (Kirejtshuk, 1986) **comb. nov.** from Australia in the more oval body, gently and evenly convex dorsum, finer and denser puncturation, much narrower head, temples somewhat angularly projecting externally behind eyes, more or less expressed posterior angles (not widely rounded) of pronotum and markedly thinner tibiae, and also in the much shorter male mandibles and antennae;
A. (*A.*) *seychellensis* (Kirejtshuk, 1997) **comb. nov.** from Seychelles and *A.* (*A.*) subcalvus (Kirejtshuk, 1986) **comb. nov.** from Australia in the oval and conspicuously pubescent body, slightly and gently convex dorsum, feebly shining integument, much narrower head and pronotum, shorter male mandibles, shorter male antennae, longer lobes of labrum, temples somewhat angularly projecting externally behind eyes, tergite VI not exposed from under elytra and another structure of aedeagus;
A. (*A.*) *titana* Poussereau, Jelínek et Audisio, 2011 from Réunion Island (known to the author only from its original description: Poussereau et al., 2011: 421) in the smaller and oval body with different coloration, much narrower head with angularly projecting temples externally behind eyes, smaller male mandibles, other proportions in most antennomeres and particularly narrower antennal club, narrower and longer labral lobes, narrower pronotum of another shape and with explanate sides, shorter elytra with explanate sides, much narrower legs and another structure of male genitalia.
Amystrops (*Amystrops*) *solitaria* differs also from *A.* (*A.*) *punctata* (known only from its original description by Grouvelle 1906: 313) at least in the somewhat larger body, shorter dorsal pubescence and longer pronotum with explanate sides.

Genus *Trimenus* Murray, 1864
Type species: *Trimenus adpressus* Murray, 1864

Subgenus *Schawalleria* subgen. nov.
Type species: *Trimenus* (*Schawalleria*) *plicatus* sp. nov.

Derivatio nominis: Patronymic. The name of this new genus is devoted to Wolfgang Schawaller (SMNS) who was friendly supporting the author's studies during many years.
Note: This monotypic subgenus can be easily distinguished after the below diagnosis which could






be used also as a comparison of it. The species description of *Trimenus* (*Schawalleria*) *plicatus* is enough detailed for characteristics of the subgenus as "descriptio generico-specifica".

Differential diagnosis: This subgenus is very distinct from the nominative subgenus in the very slightly convex (subflattened) body with extremely widely explanate pronotal and elytral sides (not narrowly explanate or only bordered sides as in the other *Trimenus* species), rather excised posterior edge of the mesoventrite between mesocoxae (not subrectilinear) and very wide epipleura. *Trimenus* (*Schawalleria*) *plicatus* differs from other congeners in the triangular labral lobes with acute apex, temples clearly angularly projecting behind eyes, truncate apex of narrow prosternal process and markedly sparser dorsal puncturation. These characters can be also treated as diagnostic for the new subgenus.

***Trimenus (Schawalleria) plicatus* sp. nov.** (Figs 1-4, plate 81 figs 1-3)

Holotype ♂ SMNS: Irian-Jaya: Jayawijaya zw. Theila u. Habbema-See, 22.10.1993, A. Riedel, 2 800-2 950 m.

Paratypes 7 specimens SMNS & ZIN: same label as in holotype.

Derivatio nominis: The epithet of this new species means "plicate", "folded" referring to character of the dorsal integument of its specimens.

Description of male (holotype): Length 5.7, width 2.5, height 0.8 mm. Elongate oval, slightly convex dorsally and ventrally; blackish with lightened antennal flagella, mouthparts, protrochanters and tarsi (reddish); dorsum with faint shine; dorsum without conspicuous hairs; underside with fine, moderately long and sparse hairs. Head and most part of pronotum with distinct punctures, about as large as eye facets, interspaces between them somewhat smaller than one puncture diameter or on pronotal disc punctures shallower and interspaces between them about as great as one puncture diameter, finely alutaceous. Elytra with more or less distinct punctures about as those on head and pronotum, interspaces between them as great as one puncture diameter, finely alutaceous. Pygidium almost microtuberculate, finely alutaceous to microreticulate. Prosternum, prohypomera, mesoventrite and most part of metaventrite very sparsely, shallowly and finely punctured and with finely alutaceous interspaces. Median part of metaventrite and distal parts of abdominal ventrites with small sparse tubercles and alutaceous. Head markedly shorter than distance between eyes, subflattened, with temples clearly angularly projecting externally behind eyes. Antennae markedly longer than head wide; scape of usual shape, somewhat longer than wide; antennomere 2 longer than antennomere 3 and subequal with each antennomeres 4 and 5, following flagellomeres gradually becoming shorter; club nearly 1.5 times as long as wide, composing two sevenths of total antennal length. Labrum moderately short and with subtriangular lobes, nearly third as long as wide and with angular median excision. Pronotum slightly and evenly convex on disc, gently and evenly sloping to extremely widely explanate sides (about 1.5 times as widely explanate as antennal club wide), broadly arcuate at sides and widest almost at basal third, with broadly rounded anterior and acute posterior angles, anterior edge shallowly and trapezium-shapedly emarginated, and posterior one shallowly bi-emarginate. Scutellum about twice as wide as long, subtriangular, with narrowly rounded apex. Elytra strongly widened, widest at midlength, almost one and seventh as long as wide combined and leaving almost entire pygidium uncovered, with rather gently sloping sides (about as widely explanate as scape width) and with transversely broadly rounded to subtruncate apices. Pygidium subtruncate at apex, from under it subangular apex of anal sclerite exposed. Mentum almost four times as wide as long, subpentagonal, with rounded sides and nearly angularly projecting anterior edge. Ultimate labial palpomere nearly cup-shaped, slightly wider than long. Ultimate maxillary palpomere almost three times as long as wide, subconical. Antennal grooves with weakly outlined both inner and outer edges and rectilinearly convergent; postocular fossae unexpressed. Prosternal process slightly curved along coxae and subparallel-sided before somewhat widened apex, with broadly emarginate posterior edge, apex about as wide as antennal club. Distance between mesocoxae subequal to and that between metacoxae more than twice as wide as that between procoxae. Mesoventrite without carina. Metaventrite subflattened before angularly excised its posterior edge between coxae. Abdominal ventrite 1 about as long as hypopygidium. Hypopygidium with widely subtruncate apex. Epipleura about 2.5 times as wide as antennal club, subhorizontal. Pro- and mesotibiae subequal in width and somewhat wider than antennal club, metatibia somewhat narrower than antennal club; protibia subtriangular and somewhat curved; mesotibia enlarged along inner side at apex. Femora of usual shape, about 1.5 times as wide as corresponding tibiae, metafemora with convex anterior and posterior edges. Protarsus about two thirds






as wide as antennal club and protibia, meso- and metatarsi markedly narrower, claws rather long and simple. Tegmen and penis trunk very moderately sclerotized. Penis trunk fused with its basal apodeme.

Sexual dimorphism: Female differs from male in somewhat narrower body, more arcuate pronotal and elytral sides, narrower tarsi, widely rounded apices of pygidium and hypopygidium.

Variability: Length 5.0-8.8 mm. The paratypes manifest some variability in coloration: from subunicolorous yellowish reddish to more contrasting one (as in the holotype). Some variability is observed in puncturation and sculpture of integument.

Differential diagnosis: See the above diagnosis of the subgenus.

Taenioncini Kirejtshuk, 1998

Genus *Carpocryraea* Kirejtshuk, 1998

Type species: *Carpophilus familiaris* Grouvelle, 1897

= *Csiromenus* Kirejtshuk et Kvamme, 2001, syn. nov. (see the below Taxonomic notes)

Type species: *Csiromenus calderi* Kirejtshuk et Kvamme, 2001

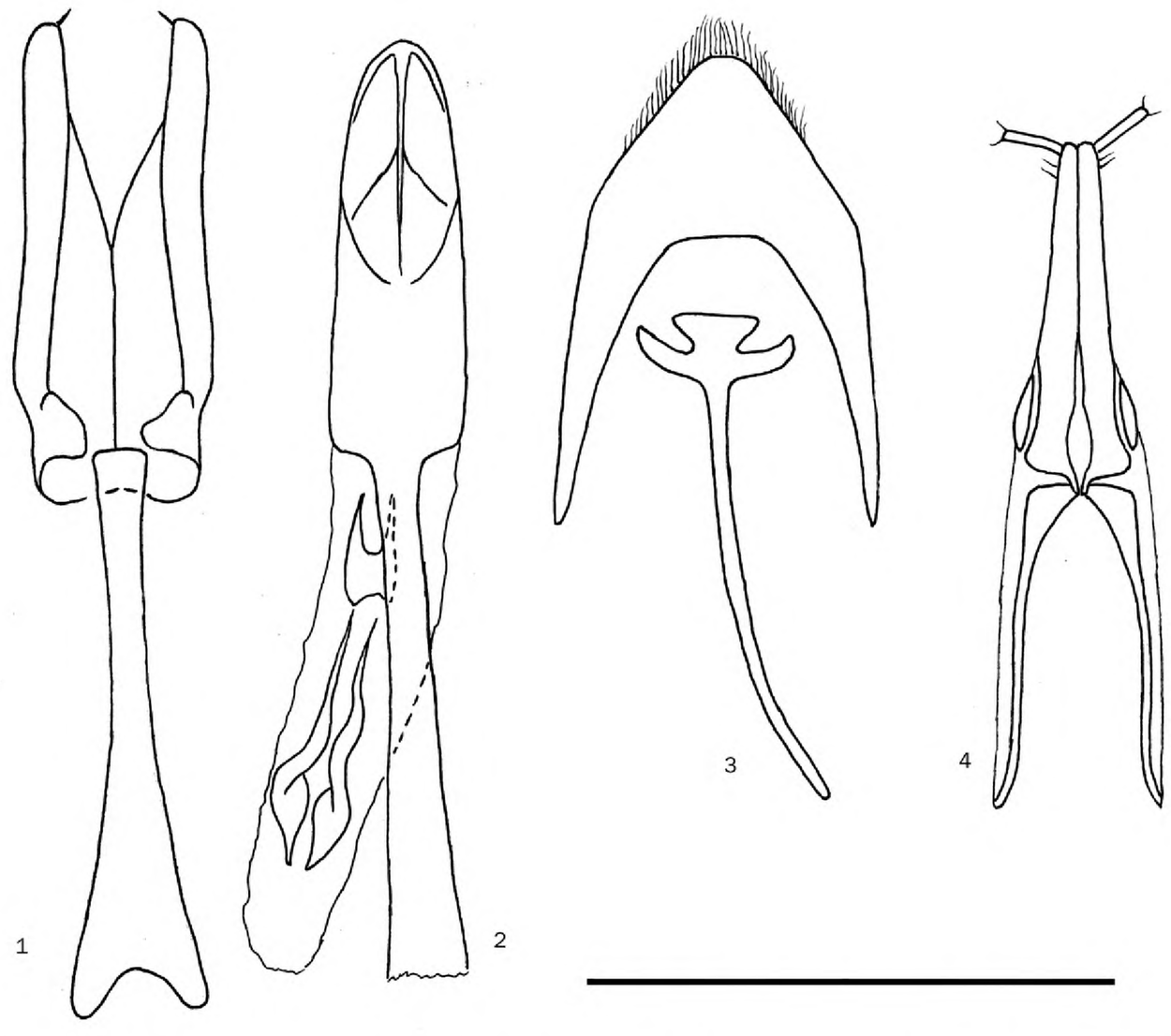
***Carpocryraea gratiosa* sp. nov.** (Figs 5-7, plate 81 figs 4-7)

Holotype ♂ ZIN: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, montane ridge between lake Gita & Gigi (Anggi Lakes), 1°23'33S, 133°55'02"E 10.IX.2015, 2200 m, primary mid montane rainforest & subalpine vegetation, inside *Rhododendron* blooms, leg. D.Telnov.

Paratypes 3♂ ZIN: same label as in holotype.

Derivatio nominis: The epithet of this new species is formed from the Latin "gratia" (grace or graceful) and "-osus" (having the quality of).

Description of male (holotype): Length 3.2, breadth 1.1, height 0.7 mm. Elongate, rather convex dorsally and moderately ventrally; subunicolorous straw reddish with darkened discs of elytra (probably because of showthrough of folded hindwings); dorsum moderately shining and underside with slight fat lustre; dorsum with extremely short and scarcely conspicuous, rather sparse and recumbent yellowish hairs, much shorter than intervals between punctures, thorax with somewhat longer and slightly conspicuous hairs, but uncovered tergites and abdominal ventrites with moderately long and moderately conspicuous hairs nearly as long as distance between punctures. Some brushes of the hairs oriented anteriorly located between posterior angles of mentum and forming a subsemicircle. Head with distinct oval punctures, smaller or nearly as coarse as eye facets, interspaces between them about half of puncture diameter in the anterior part and in middle, but much smaller at eyes and along vertex, with almost smoothed or slightly finely microreticulate. Pronotum and elytra with rather coarse



Figures 1-4.*Trimenus* (*Schawalleria* subgen.nov.) *plicatus* sp. nov., paratypes ♂ (ZIN): 1 – Tegmen, ventral view; 2 – Penis (penis trunk with basal apodeme and armature of inner sac), dorsal view; 3 – Genital capsule (anal sclerite, ventral plate and spiculum gastrale), ventral view; ♀: 4 – Ovipositor, ventral view [scale bar 1.0 mm].



punctures much larger than eye facets, separated about by one puncture diameter or less, with rather smooth interspaces between them. Pygidium, apex of tergite VI and anal sclerite with quite distinct and dense punctures, markedly smaller than on other dorsal sclerites, extremely narrow interspaces between them finely and densely microreticulated. Underside with extremely fine and very sparse punctures becoming denser in posterior part of abdomen, interspaces between them alutaceous to finely and very densely microreticulate at abdominal apex. Head slightly depressed between antennal insertions, distance between eyes nearly 1.5 times as great as its length, without raised temples. Antennae slightly shorter than head width, scape of usual shape and twice as long as wide, antennomeres 2 and 3 subequal in length and each about half as long as scape; their club suboovoid, about third of total antennal length, about 1.5 times as long as wide and with segments subequally in length and apical antennomere widest. Pronotum subtrapezoid and somewhat narrower at apex than at base, moderately steeply sloping at not explanate sides, anterior and posterior edges almost rectilinear, lateral edges broadly arcuate, anterior and posterior angles rounded. Scutellum subtriangular, about 1.5 times as wide as long and with angular apex. Elytra about 1.2 times as long as wide combined, subrectilinear at sides and widely rounded to subtruncate at apices forming very open sutural angle; leaving uncovered apex of tergite VI, pygidium and far projecting anal sclerite. Pygidium transverse, almost twice as wide as long and with truncate apex. Anal sclerite large and far projecting behind pygidial apex, subtriangular and rounded apex. Ultimate labial palpomere slightly longer than wide, widest at base. Ultimate maxillary palpomere about 3.5 times as long as wide. Mentum subhexagonal, about 2.5 times as wide as long. Antennal grooves behind mentum smoothed (without distinct edges). Prosternal process medially curved along coxae and somewhat widened before somewhat apex with widely rounded posterior edge, its apex much narrower than antennal club. Distance between coxae in each pair subequal. Metaventrite subflattened and much longer than prosternum with process, with distinct discrimen and angularly excised posterior edge. Abdominal ventrite 1 about as long as hypopygidium. Posterior edge of hypopygidium subangular and with widely rounded posterior apex. Protibia strongly curved and dilated behind the middle, with prominent and rather acuminate outer subapical process, at apex almost as wide as antennal club; mesotibia curved and angularly dilated at apex, with rather stout spines along outer edge; metatibia simple and gently curved along inner edge, with rows of moderately stout spines along outer edge; meso- and metatibiae about half as wide as antennal club. Profemur about 1.5 times, meso- and metafemora about 2.5 times as wide corresponding tibiae; posterior edge of meso- and metafemora subrectilinear to very slightly curved at apex; mesofemur widest at distal third and metafemur widest at middle. Protarsi three fourths as wide as protibia; meso- and metatarsi somewhat narrower and about two thirds as wide as corresponding tibiae; claws slightly bulged at base. Tegmen and penis trunk weakly sclerotized. Penis trunk not fused with its basal apodeme.

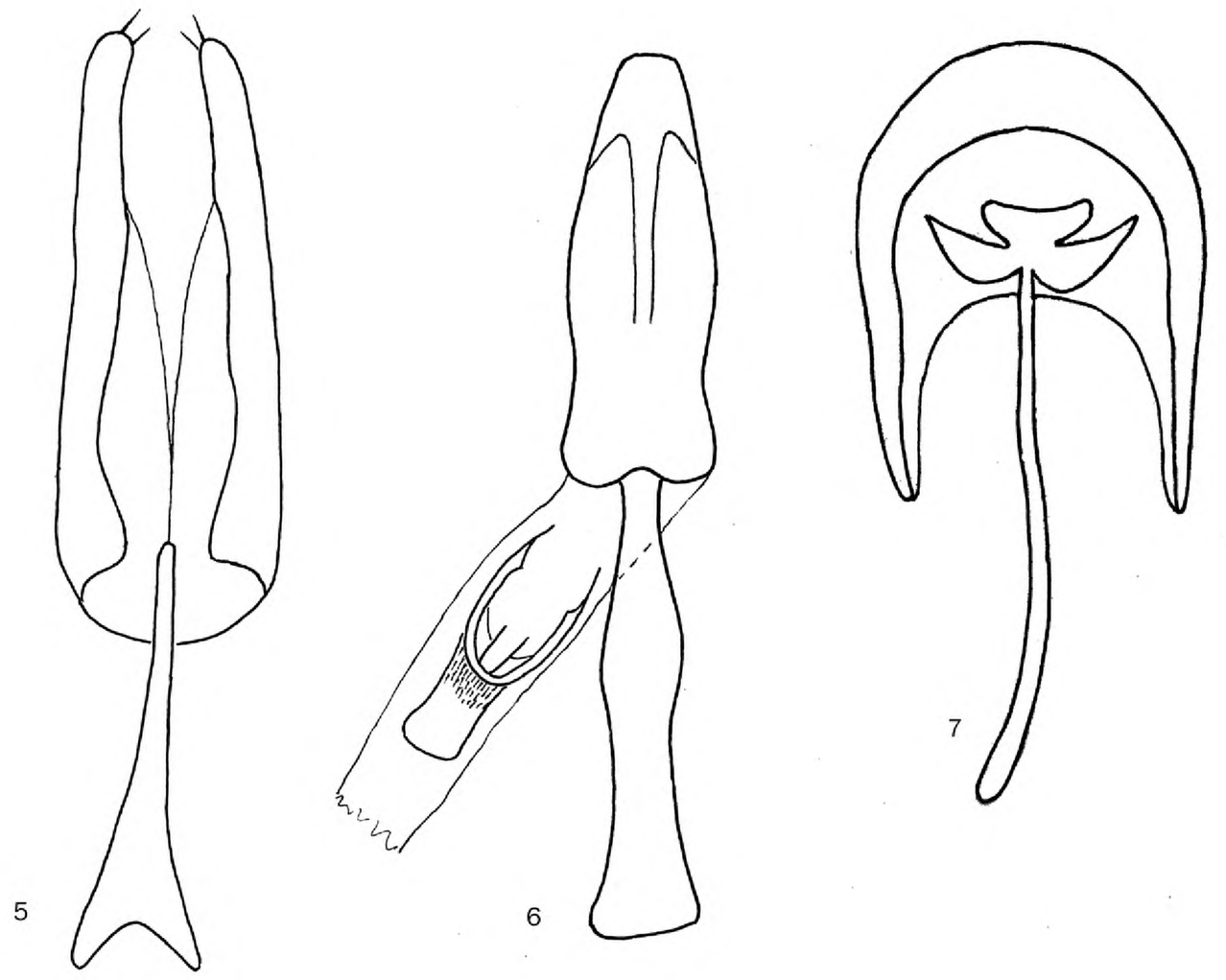
Sexual dimorphism: Female unknown.

Variability: Length 2.8-3.6 mm. A particular variability can be observed among four specimens of the type series available for this study in the expression of sexual dimorphism of tibiae which seem to not demonstrate any clear trace of allometric growth depending on body size and do not correlate with transformation of other structures. Some variability is expressed mostly in the sculpture of body integument of the paratypes.

Differential diagnosis: This new species is distinct among its congeners by its shape of the pronotum and body coloration. Besides, it differs from the Indo-Malayan *Carpocryraea familiaris* (Grouvelle, 1897) and *C. modiglianii* (Grouvelle, 1897) in the narrow and subunicolorous lighter body with much longer elytra, tarsal claws weakly bulged at base, peculiarities of sexual dimorphism in structure of pro- and mesotibiae, and apparently its armature of inner sac of penis; also from *C. familiaris* in the posterior angles of pronotum not projecting posteriorly. *Carpocryraea gratiosa* sp. nov. differs from the Australian *C. calderi* (Kirejtshuk et Kvamme, 2001) **comb. nov.**, *C. glabra* (Kirejtshuk et Kvamme, 2001) **comb. nov.** and *C. histeroides* (Kirejtshuk et Kvamme, 2001) **comb. nov.** in its light and subunicolorous body coloration, weakly bulged tarsal claws, peculiarities of its sexual dimorphism in tibiae and structure of the aedeagus; also from *C. calderi* in the tergite VI not completely exposed from under elytra, not clearly outlined antennal grooves; also from *C. glabra* in the less elongate antennal club and lack of fossa with long sensilla or setae behind mentum; also from *C. histeroides* in the not clearly outlined antennal grooves, and lack of fossa with long sensilla or setae behind mentum. However, the lightest representatives of *C. glabra* look somewhat like the specimens of *C. gratiosa*.





Figures 5-7. *Carpocryraea gratiosa* sp. nov., holotype ♂ (ZIN): 5 – Tegmen, ventral view; 6 – Penis (penis trunk with basal apodeme and armature of inner sac), dorsal view; 7 – Genital capsule (anal sclerite, ventral plate and spiculum gastrale), ventral view [scale bar 0.5 mm].

Taxonomic notes

I. On synonymy of *Carpocryraea* Kirejtshuk, 1998 and *Csiromenus* Kirejtshuk et Kvamme, 2001 **syn. nov.**

Kirejtshuk and Kvamme (2001: 429) pointed out that *Csiromenus* has the "Histeroid-like habitus, not large eyes, well outlined antennal grooves and toothed tarsal claws (although tarsal claws of some *Taeniolinus* are slightly bulbous or toothed at base and antennal grooves... It is most similar to *Carpocryraea* Kirejtshuk, 1998b clearly differing from the latter in elongate body with subflattened discs of pronotum and elytra, elongate elytra (longer than their combined width) and with transversely truncate apices, toothed tarsal claws..." *Carpocryraea gratiosa* shows body and long elytra similar to *Csiromenus*, while it has the almost simple tarsal claws and smoothed antennal grooves as in *Carpocryraea*. (although the antennal grooves in *C. glabra* are not quite distinct). Besides, aedeagus of the new species is more or less similar to those in the Indo-Malayan congeners and rather different from those in the Australian ones. Taking into consideration also the characters of species of this group remaining undescribed (mostly from New Guinea) the synonymy of these taxa rises quite evident, although further studies will be able to elaborate a subgeneric division of this group with use of *Csiromenus* as a subgeneric name. Thus, three species described in the genus Csiromenus should be considered as *Carpocryraea calderi* (Kirejtshuk et Kvamme, 2001) **comb. nov.**, *C. glabra* (Kirejtshuk et Kvamme, 2001) **comb. nov.** and *Carpocryraea histeroides* (Kirejtshuk et Kvamme, 2001) **comb. nov.**

II. The list of species of the genus *Amystrops*

The synonymy of this generic taxon was discussed in some papers by Kirejtshuk (1986, 1997, 1998, 2008), which include *Propetes* Reitter, 1975 non Walker, 1851 et nec Menge, 1854; *Amystrops* Grouvelle, 1906; *Platychorinus* Grouvelle, 1906; *Platychoropsis* Grouvelle, 1912; *Haptoncognathus* Gillogly, 1962. The most type series of the species were described by the authors and published in the above-mentioned papers and cited in the below list. In cases when the information on the studied type series was not published before, it is added after the mention of a certain species name in the below list. Most species included in this genus were recently treated as members of the genus *Propetes* (oldest synonym). As the latter name proposed for three different animal groups (Walker 1851: Auchenorrhyncha; Menge 1854: Aranaea and Reitter 1875: Coleoptera), the currently valid name was defined by Kirejtshuk (2005, 2008). However new combination for all species of this genus was not yet indicated in the previous papers and many species names here



are first published with the correct combination of generic and species names in accordance with the current taxonomic interpretation.

1. *Amystrops* (*Mandipetes*) *intrita* (Kirejtshuk, 1997: 123) **comb. nov.** [*Propetes, Mandipetes*]. Vietnam.
2. *Amystrops* (*Mandipetes*) *longipes* (Kirejtshuk, 1997: 125) **comb. nov.** [*Propetes, Mandipetes*]. Philippines (Mindanao).
3. *Amystrops* (*Amystrops*) *aquila* (Kirejtshuk, 1997: 118) **comb. nov.** [*Propetes, Propetes*]. Philippines (Mindanao).
4. *Amystrops* (*Amystrops*) *brittoni* (Kirejtshuk, 1986: 562) **comb. nov.** [*Platychoropsis*]. North and East Australia.
5. *Amystrops* (*Amystrops*) *diluta* (Grouvelle, 1906a: 201) **comb. nov.** [*Platychorinus*]. Barat Daya Islands (Damar Island). Type designation: lectotype (BMNH) here designated by A.G. Kirejtshuk and 3 paralectotypes (BMNH, MNHN) designated by A.G. Kirejtshuk – "Damma I. 92-20", "*Platychorinus dilutus* ty. Grouv." (handwritten by A. Grouvelle).
6. *Amystrops* (*Amystrops*) *dubia* (Grouvelle, 1903: 173) **comb. nov.** [*Mystrops*]. New Caledonia. Type designation: lectotype, male (IRSN) here designated by A.G. Kirejtshuk – "*Mystrops dubius* Grouv." (handwritten by A. Grouvelle), male, designated by A.G. Kirejtshuk and 3 paralectotypes (IRSN, ZIN) - "Nouvelle Caledonie, Ile de Pins, Rec. Francoise, ex coll. Fauvel"; 1 paralectotype (IRSN) - "Nouvelle Caledonie, ex coll. Fauvel"; 7 paralectotypes (MNHN) designated by A.G. Kirejtshuk – "N-Ile Caledonia", "*Mystrops dubius* ty. Grouv." (handwritten by A. Grouvelle); 2 paralectotypes (ZMB) designated by A.G. Kirejtshuk – "77000", "Ile des Tins", "*Mystrops dubius* Grouv." (handwritten by A. Grouvelle).
7. *Amystrops* (*Amystrops*) *minuta* (Gillogly, 1962: 161) **comb. nov.** [*Haptoncognathus*]. Mariana Island. Paratypes were seen by A.Kirejtshuk in FMNH.
8. *Amystrops* (*Amystrops*) *modiglianii* Grouvelle, 1906b: 312. Mentawai Islands near Sumatra. Type material: 2 syntypes (BMNH, MNHN (coll. A. Grouvelle)) – "Mentawei, Si Oban, IV-VIII.94, Modigliani", "*Amystrops modiglianii* ty. Grouv." (handwritten by A. Grouvelle). The lectotype should be designated among the syntypes of this species housed in MSNG. Syntypes with body length 3.0 and width 1.6 mm.
9. *Amystrops* (*Amystrops*) *monticola* Grouvelle, 1917: 337. Philippines (Luzon). Type material: holotype, male (MNHN) – "Mt. Makiling, Luzon, Baker", "3673", "Type", "*Amystrops monticola* Grouv." (handwritten by A. Grouvelle) with body length 2.2 and width 1.4 mm.
10. *Amystrops* (*Amystrops*) *nigripennis* (Redtenbacher, 1867: 34) **comb. nov.** [*Epuraea*]. Type designation: Kirejtshuk 1997: 117 (Sri Lanka). India (Karnataka, Kerala, Asam), Sri Lanka, Myanmar (Burma), Vietnam, China (Taiwan), Malaysia (Pahang), Japan (Ryukyu), Indonesia (Java, Lombok);
= *bicolor* Grouvelle, 1910: 244. Java. Type designation: holotype, female (MNHN) –"Java, Soakabiumi", "Type" completely corresponding to the original description including the locality label, but with missing determination label (the label "*Amystrops bicolor* Grouv." (handwritten by A. Grouvelle) is pinned under a specimen with other labels "Java, Rounes" and "Type", probably erroneously);
= *epuraeoides* Grouvelle, 1914: 39. Taiwan. Type designation: Kirejtshuk 1998: 303;
= *formosiana* Grouvelle, 1914: 39. Taiwan. Type designation: Kirejtshuk 1998: 302;
= *montana* Grouvelle, 1913:102. India (Assam). Type designation: Kirejtshuk 1998: 302. Also 1 syntype (MNHN) – "Dibrugarh, Abor, Kemp", "Type", "*Amystrops montana* Grouv." (handwritten by A. Grouvelle);
= remota Reitter, 1973: 178. [*Haptoncus*]. Myanmar (Burma). Type designation: Kirejtshuk, 1998: 302.
11. *Amystrops* (*Amystrops*) *nitida* (Gillogly, 1962: 163) **comb. nov.** [*Haptoncognathus*]. Mariana Island; Federated States of Micronesia: Western Caroline Island. Paratypes were seen by A.Kirejtshuk in FMNH.
12. *Amystrops* (*Amystrops*) *novaguineensis* (Kirejtshuk, 1990: 862) **comb. nov.** [*Platychoropsis*]. Papua New Guinea (Hagen Range and Kandep).
13. *Amystrops* (*Amystrops*) *pacifica* (Gillogly, 1962: 165) **comb. nov.** [*Haptoncognathus*]. Mariana Island, Federated States of Micronesia: Western Caroline Island. Paratypes were seen by A.Kirejtshuk in FMNH and ZIN.
14. *Amystrops* (*Amystrops*) *puberula* (Kirejtshuk, 1986: 565) [*Platychoropsis*]. Australia (Queensland)
15. *Amystrops* (*Amystrops*) *punctata* Grouvelle, 1906: 313 (original misspelling: "*punctatus*"). Mentawai Islands. This species was described probably after study of one specimen, but A. Grouvelle did not mention it in his original description (Grouvelle 1906). He usually took a duplicate for his own collection when any type series was over than one specimen. However, in the collection of MNHN where the Grouvelle's specimens are now deposited, no trace of such a duplicate of this type series was found. In the text of the original description of






this species is written: "Pygidium subtriangulaire, environs aussi long que large, tronqué au sommet chez le mâle et laissant voir le segment supplementaire..." (Grouvelle 1906: 214-215). It means that the specimen described was a male. Roberto Poggi found one specimen in MSNG with the labels: "Mentawei, Si-Oban, IV-VIII.[18]94, [E.] Modigliani", "*Amystrops punctatus* Grouv. ty." (handwritten by A. Grouvelle) and this specimen should be designated as a lectotype.

16. *Amystrops* (*Amystrops*) *reticulata* (Gillogly, 1962: 165), comb. nov. [*Haptoncognathus*]. Mariana Island; Federated States of Micronesia: Western Caroline Island. Paratypes were seen by A.G. Kirejtshuk in FMNH.

17. *Amystrops* (*Amystrops*) *seychellensis* (Kirejtshuk, 1997: 121) **comb. nov.** [*Propetes*]. Seychelles (Mahé).

18. *Amystrops* (*Amystrops*) *subcalva* (Kirejtshuk, 1986: 564) [*Platychoropsis*]. Australia (Queensland).

19. *Amystrops* (*Amystrops*) *titana* Poussereau, Jelínek et Audisio, 2011: 421 (original misspelling: "*titanus*"). Réunion Island.

III. Position of "*Amystrops bakeri*" Grouvelle, 1914: 536

The type series of this species includes two males (MNHN; lectotype here designated with body length 3.2 and width 2.3 mm) – "Los Banos, P.I.Baker","1637", "Type", "*Amystrops Bakeri* Grouv." (handwritten), "coll. A. Grouvelle" which correspond completely with the specimens of *Epuraea* (*Epuraea*) *latissima* Reitter, 1880 defined in the monograph by Kirejtshuk (1998: 158) and thereafter "*Amystrops bakeri*" should be regarded as a junior synonym: ***Epuraea* (*Epuraea*) *latissima* Reitter, 1880** (= *bakeri* Grouvelle, 1914 **comb. nov., syn. nov.**)

Thus, the range of this species after the publication by Kirejtshuk (1988) and new data on the synonymy of it includes India (Uttaranchal Pradesh), Sri Lanka, Laos, Thailand, Malaysia (Malakka), Indonesia (Sumatra, Java, Kalimantan), Taiwan and Philippines (Luzon).

IV. Position of "*Amystrops camptoides*" Grouvelle, 1916: 314

The type series of this species includes only the holotype, male (MNHN) with body length 2.4 and width 1.6 mm – "Mt. Makling, Luzon, Baker", "367", "Type", "*Amystrops camptoides* Grouv." (handwritten by A. Grouvelle), "coll. A. Grouvelle" (MNHN). This specimen has no diagnostic character making it possible to consider it among members of *Amystrops*, because its head appendages (labrum, mandibles and antennae) as those in species of *Epuraea* sensu lato but not those in species of *Amystrops*, and its elytra with transversely truncate apices leaving uncovered only apex of the pygidium (rather as in representatives of the subgenus *Epuraea* sensu str.). At the same time, the ultimate labial palpomere of "*Amystrops camptoides*" is transverse and has almost cup-like shape as that in the wide and comparatively convex representatives of *Epuraea* (*Haptoncus*) and the appearance of it looks like some wide *Haptoncus* species (*E.* (*H.*) *fanuli* Gillogly, 1982, *E.* (*H.*) *ovalis* Murray, 1864 and unicoloured *E.* (*H.*) *takhtajani*), although the pygidium of all these *Haptoncus* species, in contrast to "*Amystrops camptoides*", completely or mostly remains uncovered by elytra. Besides, the holotype of "*Amystrops camptoides*" has the male metatibiae similar to those in *E.* (*H.*) *luteola* Erichson, 1843. Thus, the species under consideration should be assigned to the subgenus *Haptoncus* and its taxonomic interpretation should be *Epuraea* (*Haptoncus*) *camptoides* (Grouvelle, 1916) **comb. nov.**

V. Position of "*Aphenolia bakeri*" Grouvelle, 1914: 539

The type series of this species includes only the holotype, female (MNHN) with body length 3.1 and width 1.5 mm – "Los Banoa, P.L. Baker", "*Aphenolia Bakeri* Grouv." (handwritten by A. Grouvelle). The specimen examined demonstrates the structure of head (labrum, palpi, mentum and eyes), shape of pronotum and elytra of this specimen are similar those in most species of *Trimenus* rather than other epuraeine genera. Besides, its meso- and metatarsi are with simple tarsomeres 1-3. Thus, this species should be considered in composition of the subgenus *Trimenus* sensu str. and its taxonomic interpretation should be *Trimenus* (*Trimenus*) *bakeri* (Grouvelle, 1914) **comb. nov.**

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A new species of *Scaphisoma* Leach, 1815 from New Guinea and a new replacement name (Coleoptera: Staphylinidae: Scaphidiinae)

Ivan Löbl [1], **Ryo Ogawa** [2]

1 – Muséum d'histoire naturelle, Case postale 6434, CH-1211, Genève 6, Switzerland; e-mail: ivan.lobl@bluewin.ch
2 – Laboratory of Insect Biodiversity and Ecosystem Science, Graduate School of Agricultural Science, Kobe University, 1-1 Rokkodai, Nadaku, 657-8501, Kobe, Japan; e-mail: ailmasbl0854@yahoo.co.jp

Abstract: *Scaphisoma telnovi* sp. nov. from the Doberai Peninsula, western New Guinea is described. This species may be readily distinguished from New Guinean congeners by its colour pattern in combination with the body-size, the shape of the sutural striae of the elytra, and the pattern of thoracic and abdominal microsculpture. *Scaphisoma distinctoides* is a new replacement name for *Scaphisoma distinctum* Löbl, Ogawa, 2016.

Keywords: Coleoptera, Staphylinidae, *Scaphisoma*, Western New Guinea, the Philippines.

Introduction

The genus *Scaphisoma* Leach is almost worldwide in distribution and is species-rich in the tropics. It was reported for the first time from New Guinea by Pic (1956) who described three new species. Löbl (1975) redescribed these species, described an additional 17 new species, and provided a key for their identification. Subsequently, he described six more new New Guinean species (Löbl 2003; 2014), and transferred the morphologically unusual *Metalloscapha papua* Löbl, 1975 to *Scaphisoma* (Löbl 2003). Most of the 27 New Guinean species of *Scaphisoma* are actually known from Papua New Guinea, with only four (*S. beccarii* Löbl, 1975, *S. inornatum* Löbl, 1975, *S. loriaei* Löbl, 1975 and *S. riedeli* Löbl, 2014) being from western New Guinea.

Four additional New Guinean species were identified within the collections made recently by D. Telnov. Though all are represented by females, one of them has a unique phenotype and is described below as it is considered unambiguously distinguishable.

Materials and methods

The body length is measured from the anterior pronotal margin to the inner apical angle of the elytra. The maximal length and width ratios of the antennomeres are given, measured from antennae mounted on slides, at identical magnification. Characters of the metanepisterna refer to their exposed parts. The abdominal sternites are counted from the first visible one (i.e., the third morphological sternite). The statements about abdominal microsculpture does not refer to the intersegmental membranes.

The habitus images were taken by a single-lens reflex camera (CANON® EOS Kiss X7) with a macro photo lens (CANON® MP-E 65 mm Macro lens) attached to a stand (LPL® CSC-10). Focus-stack images were then created with Combine ZM.

The labels are reproduced verbatim. The holotype bears a printed red "HOLOTYPE" label. The examined material will be deposited in the Naturkundemuseum Erfurt, Germany (NME).

Taxonomic part

***Scaphisoma telnovi* sp. nov.** (Fig. 1, plate 82 figs 1-2)

Holotype ♀ NME: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, Anggi Gigi Lake S env., Uper vill. 2-2,5 km NNE, 1°17'10S, 133°54'18"E, 09.IX.2015, 1900-2480 m, primary mid montane rainforest, beaten, leg. D.Telnov.





Derivatio nominis: Patronymic. The species is named in honour of its collector, Dmitry Telnov (The Entomological Society of Latvia, Rīga).

Description: Length 1.35 mm, width 0.9 mm. Pronotum and elytra not microsculptured and not iridescent. Head, pronotum, and most of elytra dark brown. Elytra each with small yellowish spot near middle centered in basal third, larger yellowish lateral spot, yellowish along lateral and apical margins, and with yellowish transverse subapical band narrowed in inner part and extended anteriad along sutural stria (plate 82 figs 1-2). Antennae (Fig. 1) with length/width ratio of antennomeres as: III 12/8: IV 22/7: V 29/8: VI 27/9: VII 35/14: VIII 26/11: IX 33/15: X 34/16: XI 48/18 (holotype). Pronotum with evenly rounded lateral margins, lateral marginal striae barely visible in dorsal view. Pronotal disc and lateral marginal striae with punctation dense and very fine, barely visible at 30X magnification. Ventral side of thorax and sternite 1 uniformly dark brown, apical abdominal segments and appendages light brown or yellowish. Exposed tip of scutellum minute. Elytra not flattened, with lateral marginal carinae entirely exposed in dorsal view, apical margins rounded, inner apical angles not prominent, situated about at level with outer angles (dorsal view); sutural margin somewhat raised, sutural striae fairly deep, angled at base, not extending along basal margin, parallel in middle section, slightly converging in apical section, finely punctate; adsutural areas narrow, flat, each with single puncture row, lateral striae impunctate. Elytral disc with punctation fairly coarse, much coarser than on pronotum, with punctures well-delimited, puncture intervals mostly two to three times as large as puncture diameters, punctures on apical section denser than on middle part of elytra. Hind wings fully developed. Hypomera and mesanepisterna smooth. Mesepimera slightly longer than intervals to mesocoxae and about four times as long as wide. Metaventrite not microsculptured, very finely punctate. Median part of metaventrite convex, with two shallow apicomedian impressions; lateral parts of metaventrite without antecoxal punctures. Submesocoxal areas about 0.03 mm long, as long as fifth of intervals to metacoxae, submesocoxal lines slightly convex, finely punctate. Metanepisternum flat, narrowed anteriad, inner margin somewhat sinuate, nearly straight, suture shallow. Protibiae straight, mesotibiae and metatibiae slightly curved. Abdomen with distinct strigulate microsculpture except on basolateral areas of sternite 1, punctation barely visible; submetacoxal areas 0.05 mm long, almost as long as third of intervals to apical margin, submetacoxal lines convex, with distinct marginal punctures.

Differential diagnosis: This new species would fit into couplet 16 with *S. baloghi* Löbl, 1975 and *S. tridentatum* Löbl, 1975 in the key of Löbl (1975). *Scaphisoma baloghi* may be readily distinguished by its smaller size with the body 1.15 mm long, the elytra each having a large, translucent spot, antennomere IX almost as long as XI, and the metaventrite microsculptured and with antecoxal puncture rows. *Scaphisoma tridentatum* is almost as large as *S. telnovi* but differs drastically by the light elytra with each having a large dark spot, the metaventrite with punctation denser on apicomedian surface than in its middle, and the microsculpture and antecoxal puncture rows of the metaventrite as in *S. baloghi.*

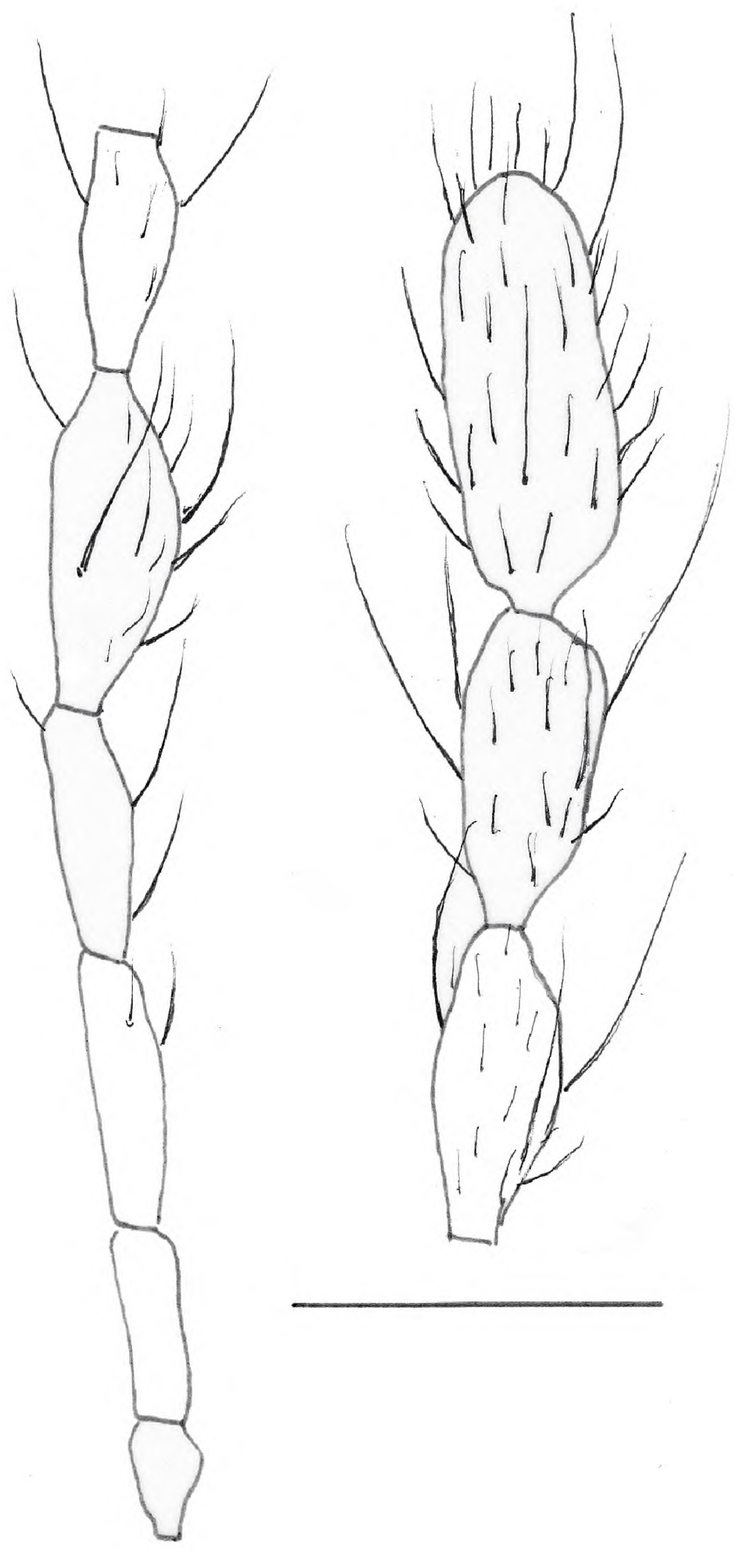


Figure 1. *Scaphisoma telnovi* sp. nov.: Antennomeres 3 to 11 [scale bar 0.1 mm].

***Scaphisoma distinctoides* nom. nov.**

Scaphisoma distinctum Löbl, Ogawa, 2016 is a junior homonym of *Scaphisoma distinctum* Blatchley, 1910, an invalid subjective synonym of *Baeocera apicalis* LeConte, 1860. The junior homonym is here replaced by *Scaphisoma distinctoides* nom. nov.

Acknowledgements

Our cordial thanks are due to Dmitry Telnov (The Entomological Society of Latvia, Rīga) who made the studied material available for examination and to A.F. Newton (Chicago, U.S.A.) who pointed to the homonymy of *Scaphisoma distinctum*.

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New leaf beetles (Coleoptera: Chrysomelidae) from New Guinea

Lev N. Medvedev

Severtsov Institute for Problems of Ecology and Evolution, Russian Academy of Sciences, Leninsky Prospekt 33, 119071, Moscow, Russia; e-mail: lev.n.medvedev@mail.ru

Abstract: Fifteen new Papuan species of Chrysomelidae are described, namely *Coenobius telnovi* sp. nov., *Bucharis rufus* sp. nov., *Stethotes telnovi* sp. nov., *Phainodina strigicollis* sp. nov., *P. thoracica* sp. nov., *Pyrrhalta telnovi* sp. nov., *Anoides fulvoniger* sp. nov., *A. nigricollis* sp. nov., *A. ornata* sp. nov., *Xenidea hartmanni* sp. nov., *Manobia insulana* sp. nov., *M. viridiaenea* sp. nov., *Sutrea fasciata* sp. nov., *S. trimaculata* sp. nov., *Trachyaphthona cyanipennis* sp. nov.

Key words: Chrysomelidae, Cryptocephalinae, Eumolpinae, Galerucinae, Alticinae, New Guinea, new species.

Introduction

Chrysomelidae of New Guinea are very poorly studied. A large revisions of most all subfamilies, including keys, were published by J.L. Gressitt (1965, 1966, 1967, 1969). Much later I also studied on this region (Medvedev 2009, 2010, 2014), discovered and described a large number of new species again.

For example, a genus *Stethotes* Baly, 1867 in Gressitt's revision (Gressit 1966) was represented by 41 species, among them 20 species were new. But when I studied large material almost 50 years later, another 29 new species were described.

The present paper is based mostly on materials collected by Dmitry Telnov (The Entomological Society of Latvia, Rīga) and received from the Naturkundemuseum Erfurt, Germany. As a result of this investigation, 15 species are described and illustrated as new for science (luckily only one new *Stethotes* among them).

Standard methods for processing entomological material were used for this study. Specimens were dry and glued on cards. Dissected male genitalia mounted on same cards near each specimen.

Acronyms used in the text:

NME – Naturkundemuseum Erfurt, Germany;
CLM – Collection Lev N. Medvedev, Moscow, Russia.

Taxonomic part

Cryptocephalinae

***Coenobius telnovi* sp. nov.** (Plate 83 fig. 1)
Holotype ♀ NME: INDONESIA E, S New Guinea, Merauke 84 km NE, Sawaeoe vill. 4 km S, Marov riverbank (upper Merauke River), 8°02'36"S, 141°00'14"E, 18.IX.2015, 13-14 m, riverside vegetation, leg. D.Telnov.

Derivatio nominis: Patronymic. This species is named after its collector.
Description: Black, labrum, fore basal antennal segments and legs fulvous. Clypeus trapeziform, as long as wide, distinctly punctate: inter-ocular space almost as wide as length of basal antennal segment, punctate, occiput impunctate. Antennae reach base of elytra, proportions of segments are as 12-4-3-3-3-6-6-6-5-5-8, preapical segments about as long as wide. Prothorax 1.55 times as wide as long, broadest at base, anterior margin with narrow collar, side margins arcuate, surface without any impressions, distinctly and sparsely punctate throughout, but without basal row of punctures, with acute basal lobe. Scutellum narrow, elongate and impunctate. Elytra 1.2 times as long as wide, moderately narrowed to behind, with regular rows, well developed throughout, interspaces flat, shining and impunctate except 3 outermost, which are distinctly convex. Body length 1.9 mm.
Differential diagnosis: 7 *Coenobius* species in New Guinea. *C. telnovi* sp. nov. is similar with *C. laratana* Gressitt, 1965, differs with entirely black






underside and distinctly punctate head.

***Bucharis rufus* sp. nov.** (Plate 83 fig. 2)
Holotype ♀ NME: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, Anggi Gigi Lake S env., Uper vill. 2-2,5 km NNE, 1°17'10"S, 133°54'18"E, 09.IX.2015, 1900-2480 m, primary mid montane rainforest, leg. D.Telnov.

Derivatio nominis: This name should point to the colour of dorsum of this species.
Description: Red, antennae fulvous with 5 apical segments black, bases of prothorax and elytra, elytral suture, margins of prosternum and mid of meso- and metasternum narrowly black. Body ovate. Head densely punctate, with longitudinal impression on vertex, inter-antennal space very broad, clypeus short, trapeziform. Antennae reach base of elytra, proportions of segments are as 9-3-3-4-4-4-5-6-6-6-7, segments 7-10 distinctly widened, 1.5 times as long as wide. Prothorax 1.9 times as wide as long, broadest at base, with almost straight lateral margins, basal margin with short process in middle, surface evenly convex, shining, with very fine and sparse punctures. Scutellum small and narrow, almost parallel-sided, twice as long as wide, impunctate. Elytra 1.1 times as long as wide, broadly rounded on apices, elytral rows thin and feeble, interspaces of rows broad, flat and impunctate. Prosternum emarginated on apex. Body length 3.7 mm.
Differential diagnosis: Differs from a single Papuan species, *B. suffriani* Baly, 1865, in red color of the dorsum and in different elytral sculpture.

Eumolpinae

***Stethotes telnovi* sp. nov.** (Fig. 1, plate 83 fig. 3)
Holotype ♂ NME: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, Anggi Gigi Lake S env., Uper vill. 2-2,5 km NNE, 1°17'10"S, 133°54'18"E, 09.IX.2015, 1900-2480 m, primary mid montane rainforest, leg. D.Telnov.

Derivatio nominis: Patronymic. This species is named after its collector.
Description: Body entirely black, only basal antennal segment fulvous. Body elongate, slightly widened to behind. Head with dense punctures, smaller on clypeus, vertex flat, without central groove, ocular grooves indistinct. Proportions of segments are as 7-5-7-7, next segments absent. Prothorax 1.15 times as wide as long, strongly narrowed to anterior margin, side margins almost straight, surface convex, densely punctate, interspaces narrower than punctures. Scutellum triangular with rounded apex, impunctate. Elytra 1.5 times as long as wide, with cuneiform apices, with irregular punctures in anterior quarter and along suture and more or less regular rows in other part, with interspaces rather broad and impunctate. All femora with small acute subapical tooth. Segment 1 of anterior and mid tarsi moderately widened. Aedeagus (Fig. 1) without any sculpture on underside. Body length 2.8 mm.
Differential diagnosis: About 70 *Stethotes* species reported from New Guinea. *S. telnovi* sp. nov. is rather similar with *Stethotes obscura* L. Medvedev, 2009, but differs specifically in colour of antennae, cuneiform apices of antennae and rather different shape of aedeagus.

***Phainodina strigicollis* sp. nov.** (Figs 2, 11-14, plate 83 fig. 4)
Holotype ♂ NME: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, montane ridge between lake Gita & Gigi (Anggi Lakes), 1°23'33"S, 133°55'02"E (2360 m) via 1°22'40"S, 133°55'56"E (2280 m) to Pamaha vill. 1°23'14S, 133°55'11"E (1960 m), 10.IX.2015, 2200 m, primary mid montane rainforest & subalpine vegetation, leg. D.Telnov.
Paratypes 11 specimens: 5 NME & 1 CLM: same locality as in holotype; 2 NME & 1 CLM: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, Anggi Gigi Lake S env., Uper vill. 2-2,5 km NNE, 1°17'10"S, 133°54'18"E, 09.IX.2015, 1900-2480 m, primary mid montane rainforest, leg. D.Telnov; 1 NME: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, Anggi Gigi Lake S env., Uper vill., 1°18'05"S, 133°54'24"E, 09-10.IX.2015, 2200 m, primary mid montane rainforest, white light, leg. D.Telnov; 1 NME: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, Anggi Gigi Lake S env., Uper vill., 1°18'05"S, 133°54'24"E, 10-11.IX.2015, 2200 m, primary mid montane rainforest, white light, leg. D.Telnov.

Derivatio nominis: This name should point to the conspicuous densely strigose sculpture of prothorax of this species.
Description: Head fulvous with metallic tint and more or less bronze vertex, antennae black with 3-4 basal segments fulvous, prothorax bronze, scutellum and elytra fulvous, sometimes with darkened small areas or entirely dark (Figs 11-14), underside dark fulvous, legs fulvous; sometimes all upperside including head entirely fulvous. Body ovate. Frontoclypeus strongly punctate, vertex convex, impunctate, grooved medially, ocular grooves deep and sharp. Antennae almost reach middle of elytra, proportions of segments are as 7-5-5-7-6-6-7-7-7-8-9, five apical segments slightly thickened, about 2.5 times as long as wide. Prothorax 1.6 times as






wide as long, broadest in middle, side margins arcuate, surface shining, densely longitudinally (at sides obliquely) strigose. Elytra 1.4 times as long as wide, apices rounded, surface with feeble postbasal depression, distinct rows of punctures, feebler on apical slope, interspaces flat, shining, narrower than diameter of punctures. All femora toothed, with large triangular tooth on fore legs and small on mid and hind ones. Tarsal segment 1 of male moderately enlarged, triangular. Aedeagus (Fig. 2) strongly narrowed to base and deeply concave on underside, apex subtruncate with small central tooth. Body length in males 2.6-2.8 mm, in females 2.9-3.2 mm.

Differential diagnosis: 13 *Phainodina* species hitherto known from New Guinea. *Phainodina strigicollis* sp. nov. differs well from its congeners (Gressitt, 1969) in prothorax being longitudinally strigose.

***Phainodina thoracica* sp. nov.** (Fig. 3, plate 83 fig. 5)

Holotype ♂ NME: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, Anggi Gigi Lake S env., Uper vill. 2-2,5 km NNE, 1°17'10"S, 133°54'18"E, 09.IX.2015, 1900-2480 m, primary mid montane rainforest, leg. D.Telnov.

Derivatio nominis: This name should point to the conspicuous sculpture of prothorax of this species.

Description: Head dark metallic bronze with fulvous labrum, clypeus and palpi; antennae piceous with 5 basal segments fulvous, prothorax dark metallic bronze with middle of basal margin fulvous, scutellum dark, elytra fulvous with blackish spots (fig. 15), underside black, legs blackish with fulvous bases of femora. Body elongate- ovate. Frontoclypeus punctate, vertex densely micro-sculptured, ocular grooves deep and sharp. Proportions of antennal segments are as 7-5-6-7-8-8-9, next segments absent. Prothorax 1.8 times as wide as long, broadest in middle, lateral margin arcuate, surface uneven, dull, densely micro-sculptured and longitudinally strigose. Elytra 1.4 times as long as wide, with rounded apices, surface with feeble post-basal impression, rows of punctures well-developed, but feebler on apices, interspaces flat, finely punctate and broader than diameter of punctures in rows. All femora toothed. Tarsal segment 1 of fore legs moderately widened. Aedeagus (Fig. 3) strongly narrowed to base, with tridentate apex. Body length 3.2 mm.

Differential diagnosis: Very near to preceding species, differs in larger body, different elytral pattern, but especially in densely microsculptured prothorax.

Galerucinae
Galerucini

***Pyrrhalta telnovi* sp. nov.** (Figs 4, 16-18, plate 83 fig. 6)

Holotype ♂ NME: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, Anggi Gigi Lake S env., Uper vill., 1°18'05"S, 133°54'24"E, 10-11.IX.2015, 2200 m, primary mid montane rainforest, white light, leg. D.Telnov.
Paratypes 1 NME & 1 CLM: same locality as in holotype.

Derivatio nominis: Patronymic. The species is dedicated to its collector.

Description: Fulvous, 5-6 apical antennal segments, large spot on vertex, scutellum, poorly delimited basal and lateral margin of elytra (almost reduced in one paratype, see Figs 16-18), sides of metasternum and abdomen black. Body elongate, 2.25 times as long as wide. Head and all upper-side covered with white dense pubescence. Clypeus triangular, large, well-delimited, sparsely punctate, vertex dull, very densely punctate and micro-sculptured. Antennae reach anterior third of elytra, proportions of segments are as 8-3-10-7-6-6-6-6-5-5-7, pre-apical segments about 2-2.3 times as long as wide. Prothorax 1.7 times as wide as long, broadest in anterior third, lateral margins very feebly arcuate, anterior and posterior angles obtuse, posterior margin slightly emarginated before scutellum, surface very densely punctate and granulate. Scutellum triangular with rounded apex, punctate and densely micro-sculptured. Elytra 1.2 times as long as wide, practically parallel-sided with rounded apex, surface without any ridges or convexities, finely and very densely punctate, with micro-sculptured interspaces. Segment 1 of fore and mid tarsi not widened. Aedeagus as in Fig. 4. Body length 4.8-5.5 mm.

Differential diagnosis: A single species described from New Guinea, *Pyrrhalta wallacei* (Baly, 1886), is larger and has prothorax with 3 black spots. The species somewhat resembles *P. hageni* (Jacoby, 1887) from Sumatra and Malaysia, but has black apical antennomeres.

***Anoides fulvoniger* sp. nov.** (Fig 20, plate 83 fig. 7)

Holotype ♂ NME: INDONESIA E, S New Guinea, Merauke 32-23 km E, Wasur NP, 8°31'22"S, 140°40'48"E (dry riverbed & pools) to 8°29'23"S, 140°36'38"E (semidry eucalypt forest), 16.IX.2015, 14-15 m, leg. D.Telnov.



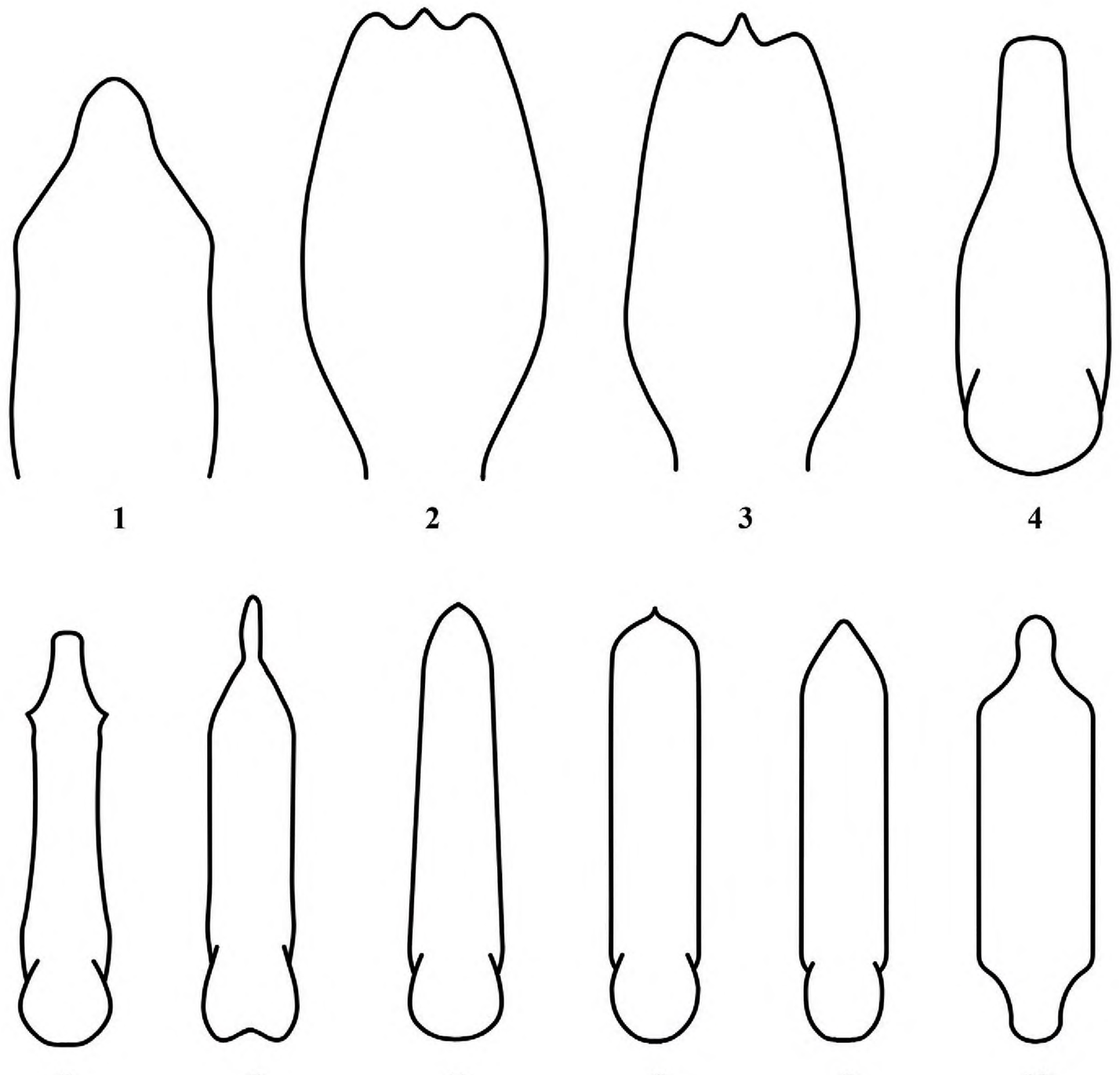



Derivatio nominis: The name should point to the dorsal colouration of this species.
Description: Fulvous, elytra with very large black spot, occupaying posterior two thirds except narrow lateral and apical margin (Fig. 20). Body elongate ovate, twice as long as wide. Head finely micro-sculptured, inter-antennal space broad and convex, frontal tubercles narrow and almost transverse, delimited posteriorly, vertex with longitudinal impression, deeper anteriorly. Antennae reach middle of elytra, proportions of segments are as 12-6-14-14-13-13-13-11-10-9 (apical segment absent), pre-apical segments about 3 times as long as wide. Prothorax 2.6 times as wide as long, broadest in basal third, lateral margins feebly arcuate, surface micro-sculptured, rather finely and densely punctate. Scutellum triangular with rounded apex, densely micro-sculptured. Elytra 1.5 times as long as wide, elongate ovate, broadest in apical third, with explanate lateral margin, surface shining, finely and densely punctate. Segment 1 of anterior and mid tarsi not widened. Aedeagus (lost during dissection) parallel-sided with rounded apex. Body length 9 mm.

Differential diagnosis: Generally resembles *Anoides lorentzi* Weise, 1912 but head, underside of the body and legs are fulvous and black pattern of elytra don't reach lateral and apical margins.

***Anoides nigricollis* sp. nov.** (Fig. 21, plate 83 fig. 9)
Holotype ♀ NME: INDONESIA E, W New Guinea, Doberai Peninsula, Ayamaru vill. 23 km SE, Aqafu springs, 1°23'15"S, 132°22'04"E, ~330-340 m, 04.IX.2015, primary lowland rainforest on limestone, near the springs, leg. D.Telnov.

Derivatio nominis: This name should point to the dark colour of prothorax.
Description: Head black with fulvous labrum and dark fulvous frontal tubercles, antennae black with fulvous basal segment, prothorax black, scutellum fulvous, elytra fulvous with bluish black pre-apical broad band, not reaching extreme apex (Fig. 21), underside fulvous with sides of pro-sternum and abdominal segments 1-3 black, legs fulvous with apices of femora and tibiae (at least on upper-side) black. Body elongate ovate, 1.7 times as long as wide. Head shining, finely and densely punctate,



Figures 1-10. Aedeagi of Papuan Chrysomelidae, ventral view. 1 – *Stethotes telnovi* sp. nov.; 2 – *Phainodina strigicollis* sp. nov.; 3 – *P. thoracica* sp. nov.; 4 – *Pyrrhalta telnovi* sp. nov.; 5 – *Anoides ornata* sp. nov.; 6 – *Xenidea hartmanni* sp. nov.; 7 – *Manobia viridiaenea* sp. nov.; 8 – *M. insulana* sp. nov.; 9 – *Sutrea trimaculata* sp. nov.; 10 – *Trachyaphthona cyanipennis* sp. nov.



inter-antennal space narrow and ridged, frontal tubercles flat and poorly delimited. Antennae almost reach middle of elytra, proportions of segments are as 7-5-20-9-8-7-6-6-7-7-11, pre-apical segments 2.5 times as long as wide. Prothorax 1.6 times as wide as long, lateral margins almost straight with broadly rounded anterior angles and obtuse posterior angles, surface with microscopical dense punctures throughout and rather large sparse punctures, mostly behind middle. Scutellum triangular with rounded apex, finely punctate. Elytra 1.35 times as long as wide, elongate-ovate, widest in apical third, lateral margin explanate, surface shining, confusedly punctate, with two pairs of regular rows in sutural area and short scutellar row. Body length 9 mm.

Differential diagnosis: Seven *Anoides* species reported from New Guinea. *A. nigricollis* sp. nov. is similar with *A. binotata* Bowdich, 1914 (which also has black thorax), but is different in head being black, partly black underside and legs and in generally different elytral pattern. Elytral coloration is unique in this new species and differs well from all congeners.

***Anoides ornata* sp. nov.** (Figs 5, 19, plate 83 fig. 8)

Holotype ♂ NME: INDONESIA E, S New Guinea, Merauke 24,5 km N, Salore vill env., Kumbe left riverbank, 8°16'26"S, 140°22'50"E, 17.IX.2015, 10 m, sago swamp & muddy riverbank, leg. D.Telnov.

Derivatio nominis: The name should point to the conspicuous elytral pattern of this species.

Description: Fulvous, elytra with 2 spots in middle and large pre-apical spot black (Fig. 19). Body elongate ovate, 1.6 times as long as wide. Head shining, impunctate, inter-antennal space rather broad, convex, but not ridged, frontal tubercles narrow and transverse, delimited posteriorly, vertex with longitudinal impressed line. Proportions of segments are as 12-6-10-12-11, next segments absent. Prothorax 2.2 times as wide as long, broadest before base, lateral margins straight with obtuse anterior and broadly rounded posterior angles, surface shining, finely and sparsely punctate, with a few shallow impressions on sides. Scutellum triangular with rounded apex, micro-sculptured and sparsely punctate. Elytra 1.5 times as long as wide, elongate ovate, widest in apical third, with explanate lateral margins, surface shining, finely and densely punctate. Segment 1 of anterior and mid tarsi not widened. Aedeagus as in Fig. 5. Body length 9.5 mm.

Differential diagnosis: *Anoides ornata* sp. nov. resembles *A. notabilis* Weise, 1912 but is different in more complicated elytral pattern represented by 3 spots (2+1).

Alticini

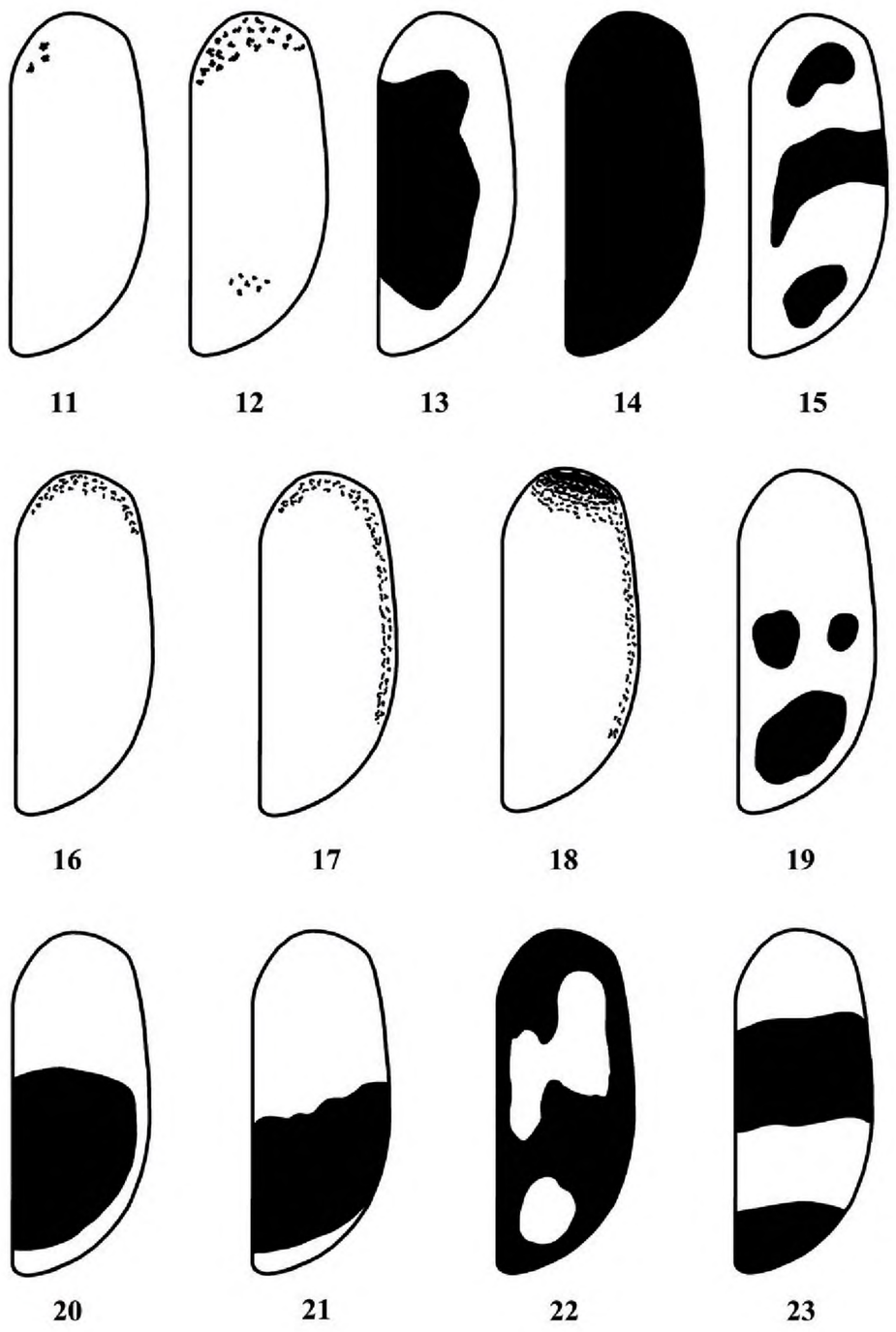
***Xenidea hartmanni* sp. nov.** (Fig. 6, plate 83 fig. 10)

Holotype ♂ NME: West Papua, Prov. Manokwari, 18 km. NW Ransiki, Anggi Giga Kampungitkai, 01°24'23"N, 133° 56'53"E, 1990 m, 4.III.2007, cutting area/prim forest, leg. A. Skale.

Paratypes 3♀: 1 NME & 1 CLM: same locality as in holotype; 1♀ NME: West Papua, Prov. Manokwari, vic. Mokwam, Styoubrig, 01° 06'26" S, 133 ° 54'41" E, 1400-1800 m, 24-28.II.2007.

Derivatio nominis: Patronymic. I dedicate this species to Mathias Hartmann (NME), who provided me with rich Oriental Chrysomelidae material.

Description: Head and upperside metallic bronze, labrum blackish with fulvous margins, antennae fulvous with darkened apical segments,



Figures 11-23. Elytral pattern of Papuan Chrysomelidae. 11-14 – *Phainodina strigicollis* sp. nov.; 15 – *P. thoracica* sp. nov.; 16-18 – *Pyrrhalta telnovi* sp. nov.; 19 – *Anoides ornata* sp. nov.; 20 – *A. fulvoniger* sp. nov.; 21 – *A. nigricollis* sp. nov.; 22 – *Sutrea trimaculata* sp. nov.; 23 – *Sutrea fasciata* sp. nov.



underside and legs black with fulvous tarsi. Body elongate ovate. Frontovertex microsculptured and distinctly punctate, interantennal space narrow and convex. Antennae reach middle of elytra, proportions of segments are as 11-8-5-6-6-6-7-7-7-7-11, preapical segments about 1.7 times as long as wide. Prothorax 1.5 times as wide as long, lateral margins almost straight from base to angulation in anterior quarter, surface microsculptured and densely punctate, with interspaces smaller than diameter of punctures, antebasal depression feeble, deeper in middle opposite scutellum, but sharply delimited on sides with short longitudinal impressions. Scutellum triangular with rounded apex. Elytra 2.1 times as long as wide, without post-basal impression, regularly punctate with strongly costate interspaces of rows. Hind tibiae with feeble preapical excavation, mid tibiae simple. Aedeagus parallel-sided with long apical process (Fig. 6). Body length in males 2.2 mm, in females 2.5-2.7 mm.
Differential diagnosis: Nine *Xenidea* species hitherto known from New Guinea. *X. hartmanni* sp. nov. is similar with *X. pusilla* Jacoby, 1894 which is however smaller (body length 2.2 mm), has metallic blue dorsum, impunctate head and laterally not delimited antebasal impression of prothorax.

***Manobia insulana* sp. nov.** (Fig. 8, plate 83 fig. 11)
Holotype ♂ NME: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, Anggi Gita Lake, Tombrok vill. & surroundings, 1°22'09"S, 133°57'31"E, 06-07.IX.2015, 1880-2200 m, primary mid montane rainforest, leg. D.Telnov.
Paratypes 3 NME & 1 CLM: same locality as in holotype.

Derivatio nominis: This species is named after its locality, world's second largest island - New Guinea.
Description: Metallic blue, antennae fulvous with darkened apical segments, sometimes basal segment also blackish, underside bluish black, legs black or piceous in females, with fulvous fore and mid tibiae in males. Head sparsely punctate on frons and vertex, frons 1.65 times as wide as eye, frontal tubercles obliquely placed, sharply delimited posteriorly. Antennae reach middle of elytra, proportions of segments are as 7-4-3-3-5-5-5-6-6-5-5, pre-apical segments about 2.5 times as wide as long. Prothorax 1.5 times as wide as long, lateral margins almost straight, anterior angles not angulate, hind margin without distinct basal lobe, basal transverse impression moderately deep and straight, with a row of punctures, rest surface shining, with sparse and very small punctures. Elytra 1.5 times as long as wide, with very feeble and not delimited basal convexity, elytral rows distinct throughout, but feebler on apical slope. Segment 1 of fore and mid tarsi slightly thickened in male. Aedeagus as in Fig. 8. Body length in males 2.3-2.4 mm, in females 2.5-2.7 mm.
Differential diagnosis: Resembles *Manobia rectisulcata* L. Medvedev, 2008 from Sulawesi, differs with entirely black head, finely punctured prothorax, feebler basal convexity of elytra and different shape of aedeagus.

***Manobia viridiaenea* sp. nov.** (Fig. 7, plate 83 fig. 12)
Holotype ♂ NME: INDONESIA E, W New Guinea, Doberai Peninsula, Ayamaru vill. env., creek Fanmuis between the road and lake, 1°17'37"S, 132°14'48"E, ~260-270 m, 01.IX.2015, limestone creek, leg. D.Telnov.
Paratypes 32 specimens: 22 NME & 2 CLM: same locality as in holotype; 7 NME & 1 CLM: INDONESIA E, W New Guinea, Doberai Peninsula, Ayamaru vill. ~8,3 km SE, 1°18'54"S, 132°15'28"E, ~360 m, 02-03.IX.2015, primary lowland rainforest on limestone, white light, leg. D.Telnov.

Derivatio nominis: This name should point to the colour of dorsum of this species.
Description: Upperside greenish aeneous, antennae fulvous with darkened 5-6 apical segments, underside and legs black or piceous, anterior and mid tibiae sometimes fulvous. Head impunctate, frons 1.7 times as wide as eye, frontal tubercles obliquely placed, sharply delimited. Antennae almost reach middle of elytra, proportions of segments are as 7-4-4-4-5-5-5-5-5-5-7, pre-apical segments about twice as long as wide. Prothorax 1.3 times as wide as long, broadest near middle, lateral margins almost straight, only slightly narrowed anteriorly, anterior angles not angulate, hind margin with small basal lobe, basal transverse impression feebly arcuate, densely punctate, rest surface shining, with sparse and very small punctures. Elytra 1.45 times as long as wide with strong, sharply delimited and impunctate basal convexity, mid third of disc with fine rows of punctures, more distinct in female, apical third practically impunctate. Segment 1 of fore and mid tarsi not thickened in male. Aedeagus as in Fig. 7. Body length 2-2.3 mm.
Differential diagnosis: Only one *Manobia* species previously reported from New Guinea. *M. viridiaenea* sp. nov. somewhat resembles *M. dohertii* Jacoby, 1893 from Malaysia, but differs specifically in strongly punctate basal impression of prothorax and in shape of aedeagus.






***Sutrea fasciata* sp. nov.** (Fig. 23, plate 83 fig. 13)
Holotype ♀ NME: INDONESIA E, W New Guinea, Doberai Peninsula, Ayamaru vill. 23 km SE, Aqafu springs, 1°23'15"S, 132°22'04"E, ~330-340 m, 04.IX.2015, primary lowland rainforest on limestone, near the springs, leg. D.Telnov.

Derivatio nominis: The name should point to the dark fasciate elytral pattern of this species.
Description: Black, 3 apical antennal segments and anterior angles of prothorax fulvous, elytra fulvous with transverse band in middle and apex black (Fig. 23). Body elongate ovate, 1.8 times as long as wide. Head mostly impunctate, clypeus triangular, inter-antennal space narrow, but not ridged, frontal tubercles cuneiform and convex, vertex with sparse microscopic punctures. Antennae reach apical third of elytra, proportions of segments are as 10-4-9-12-12-10-10-9-9-8-11, preapical segments 2.5-3 times as long as wide. Prothorax 1.8 times as wide as long, broadest in middle, side margins arcuate, anterior angles rounded, surface shining and impunctate. Scutellum elongate triangular with rounded apex, densely micro-sculptured. Elytra 1.5 times as long as wide, with fine and rather dense confused punctures. Body length 7.5 mm.
Differential diagnosis: Fifteen *Sutrea* species were known from New Guinea till now. *S. fasciata* sp. nov. is similar with *S. triplagiata* Jacoby, 1904 (New Guinea) which is smaller, has different elytral pattern and only terminal antennomere is fulvous in this species.

***Sutrea trimaculata* sp. nov.** (Figs 9, 22, plate 83 fig. 14)
Holotype ♂ NME: INDONESIA E, S New Guinea, Merauke 24,5 km N, Salore vill env., Kumbe left riverbank, 8°16'26"S, 140°22'50"E, 17.IX.2015, 10 m, sago swamp & muddy riverbank, leg. D.Telnov.
Paratypes 6 NME & 2 CLM: same locality as in holotype.

Derivatio nominis: This name should point to the conspicuous, trimaculate elytral pattern.
Description: Fulvous, elytra dark piceous to black with 3 fulvous spots, anterior spots partly connected with each other (Fig. 22), breast partly darkened. Body elongate, twice as long as wide. Head impunctate, clypeus triangular, inter-antennal space moderately narrow, flat, frontal tubercles long and narrow, touching each other. Antennae almost reach middle of elytra, proportions of segments are as 13-6-10-12-11-10-10-10-10-8-10, preapical segments about 4-5 times as long as wide. Prothorax 1.8 times as wide as long, with lateral margins feebly arcuate and anterior angles broadly rounded, surface shining, with very fine and sparse punctures. Scutellum triangular, impunctate. Elytra 1.5 times as long as wide, almost parallel-sided with rounded apices, surface shining and very finely punctate. Fore and mid tarsi of male with segment 1 feebly widened. Aedeagus as in Fig. 9. Body length 4.7-4.9 mm.
Differential diagnosis: Fifteen *Sutrea* species were known from New Guinea till now. *S. trimaculata* sp. nov. is similar with *S. wallacei* Baly, 1874 but differs specifically in elytral pattern, represented with 3 partly connected fulvous spots.

***Trachyaphthona* (*Longitarsella*) *cyanipennis* sp. nov.** (Fig. 10, plate 83 fig. 15)
Holotype ♂ NME: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, Anggi Gita Lake, Tombrok vill. & surroundings, 1°22'09"S, 133°57'31"E, 06-07.IX.2015, 1880-2200 m, primary mid montane rainforest, leg. D.Telnov.
Paratypes 6 specimens: 2 NME & 1 CLM: same locality as in holotype; 3 NME: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, Syoubri vill., 1°07'16"S, 133°54'34"E, 1570-2100 m, primary lower montane rainforest, 11-12.IX.2015, leg. D.Telnov.

Derivatio nominis: The name should point to the blue colouration of elytra of this species.
Description: Fulvous, antennal segments 5-11 black, scutellum and under-side black, elytra metallic blue, hind legs black with fulvous tarsi. Body elongate. Clypeus triangular, impunctate, vertex finely punctate, frontal tubercles cuneiform, but poorly delimited behind. Antennae reach middle of elytra, proportions of segments are as 12-6-11-11-11-10-9-8-8-8-10, pre-apical segments about 3 times as long as wide. Prothorax 1.8 times as wide as long, lateral margins almost parallel-sided, surface shining, finely and sparsely punctate, basal impression rather broad, especially in middle. Scutellum triangular with rounded apex, finely and densely punctate. Elytra 1.5 times as long as wide, slightly widened to behind, with feeble basal convexity, densely and confusedly punctate. Segment 1 of anterior and mid tarsi not widened in male, of posterior tarsi thin, as long as a half of tibia. Aedeagus as in Fig. 10. Body length 3.3-4 mm.
Differential diagnosis: 1 species of *Trachyaphthona* s. str. in New Guinea. The species in question differs from both *Longitarsella* species (*L. binotata* (Baly, 1876) of South China, Vietnam and Thailand and Siamese *L. notatipennis* L. Medvedev, 2009) in metallic color of elytra. It is rather alike in color at *T. (Zipangia) coeruleipennis* L. Medvedev, 2009






from Laos, but differs in structure of hind legs.
Note: *Trachyaphthona* Heikertinger, 1924 was synonymized with *Trachytetra* Sharp, 1886 from New Zealand (Konstantinov & Prathapan 2008). But *Longitarsella* L. Medvedev, 2009 differs sharply from *Trachytetra* in structure of prothorax and especially hind tarsi, having very long basal segment, so I prefer for the moment to not include *Longitarsella* in *Trachytetra*. In my opinion several recently proposed and published Chrysomelidae synonyms are doubtful or incorrect.

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Checklist of the family Lecithoceridae (Lepidoptera: Gelechioidea) in New Guinea, with description of two new species

Kyu-Tek Park

The Korean Academy of Science and Technology, Seungnam, Gyeonggi Prov., 13630, Republic of Korea; e-mail: ktpark02@gmail.com

Abstract: A checklist of all 146 known species of the family *Lecithoceridae* in New Guinea is provided. Two species of this family from Papua of Indonesia and Papua New Guinea are described, namely *Lecithocera breiensis* sp. nov. and *Aprosoesta laminella* sp. nov.

Key words: Checklist, taxonomy, *Aprosoesta*, *Lecithocera*, new species, New Guinea.

Introduction

The family Lecithoceridae is one of highly diverse microlepidoptera, with more than 1230 species worldwide (Park 2015). However, it has been poorly studied due to the economic unimportance of its larvae, which mostly feed on dead plant material; few specialists on this group are available worldwide. The family is highly diverse in the Oriental, Australian, Oceanian and Neotropical regions. In a faunal study of New Guinea (Papua New Guinea and Papua of Indonesia), Diakonoff (1954) reviewed the population diversity of the family in the western part of the island (Papua of Indonesia), reporting 78 species in the Gelechiidae group (31 species of *Lecithocera* Herrich-Schäffer, 40 species of *Crocanthes* Meyrick, and seven species of little known genera including *Asmenistis* Meyrick, *Gonaepa* Walker, *Periphorectis* Meyrick). He placed all species related to the subfamily Lecithocerinae in *Lecithocera,* and placed the others, whose gnathos were absent in the male genitalia, in *Crocanthes*. Diakonoff also described *Asmenistis semifracta* from Papua, based on a single female, but did not illustrate its genitalia. The generic status of *semifracta* Diakonoff is still uncertain and listed tentatively in the subfamily Lecithocerinae.

Since this study by Diakonoff (1954), no comprehensive work had been conducted on Lecithoceridae in New Guinea. However, since 2010, Park and his co-authors have published several dozens of papers on Lecithoceridae from New Guinea (Park 2010, 2011a-h, 2012a-e, 2013, 2014, 2015; Park & Byun 2010; Park & Lee 2013a-c; Park et al. 2016), describing more than 80 new species belonging to 12 new genera of the family Lecithoceridae from New Guinea. These genera include *Neopectinimura* Park, 2010; *Hamatina* Park, 2011; *Neotimyra* Park, 2011; *Onnuria* Park, 2011; *Scolizona* Park, 2011; *Strombiola* Park, 2011; *Crinellus* Park, 2012; *Lacuniola* Park, 2012; *Sulciolus* Park, 2012; *Hannara* Park, 2013; *Lamprista* Park, 2013; and *Pacificulla* Park, 2013.

In New Guinea, a total of 146 species of the family have been found, comparing to the 48 species known from the Australian Region. The subfamily Lecithocerinae is the most diverse group, with 76 known species; the subfamily Crocanthinae holds 68 known species, while Torodorinae contains only two species.

The genus *Lecithocera* from New Guinea currently contains 28 known species. *Lecithocera nomaditis* has been found in the nearby Solomon Islands, and two more species, *L. perigypsa* and *L. lamprodesma*, have been reported from Celebes, Indonesia, an area located near the border of the Oriental and Oceanian Regions. Meyrick (1925) listed *Brachmia thraneuta* (Meyrick) and *Lecithocera caligula* Meyrick as synonyms of *L. invariella* Walker, and thus Diakonoff (1954) listed *L. invariella* in the key of *Lecithocera* of New Guinea. The species *Torodora thraneuta* was described in India and Sri Lanka (Meyrick, 1911), *L. invariella* in Sarawak, Malaysian Borneo (Walker 1864), and *L. caligula* was from New Guinea (Meyrick 1918). However, the species *invariella* Walker is excluded from the





check list, because the taxonomic status of *caligula* Meyrick and the relationship between *invariella* Walker and *caligula* Meyrick is still uncertain.

Table 1. Genera of Lecithoceridae and species richness recognized in New Guinea.

Genus	**Number of species**	**Genus**	**Number of species**
Lecithocerinae		**Torodorinae**	
Asmenistis Meyrick, 1925	1	*Thubana* Walker, 1886	1
Crinellus Park, 2012	1	*Torodora* Meyrick, 1894	1
Hamatina Park, 2011	6	Subtotal	**2**
Lacuniola Park, 2012	1	**Crocanthinae**	
Lecithocera Herrich-Schäffer, 1853	28	*Aprosoesta* Turner, 1919	12
Neotimyra Park, 2011	5	*Crocanthes* Meyrick, 1886	20
Onnuria Park, 2011	5	*Gonaepa* Walker, 1886	9
Pectinimura Park, 2008	5	*Hannara* Park, 2013	2
Sarisophora Meyrick, 1904	9	*Lamprista* Park, 2013	3
Scolizona Park, 2011	3	*Pacificulla* Park, 2013	22
Strombiola Park, 2012	1		
Sulciolus Park, 2012	7	Subtotal	**68**
Telephata Meyrick, 1916,	4	**TOTAL**	**146**
Subtotal	**76**		

The genus *Aprosoesta* had been treated as a junior category of *Crocanthes* by previous authors, but was reclassified as a distinct genus by Park (2015). A total of 12 species have been described in New Guinea, with only one species, *A. pancala*, occurring in both New Guinea and Australia (Park et al. 2016). An additional new species is described later in this article.

Materials and methods

The materials examined were based on material collected from Papua New Guinea by V.O. Becker in 1992 and preserved in the USNM, as well as material collected by R. de Vos and his colleagues from Papua (former Irian Jaya) of Indonesia in 1993 and preserved in the RMNH. Various types of materials are deposited in both museums.

Abbreviations used in the text:

ANIC – The Australian National Collection of Insects, Canbera, Australia;
BMNH – The Natural History Museum, London, United Kingdom;
MHUB – The Museum für Naturkunde Humboldt-Universität zu Berlin, Germany;
USNM The National Museum of Natural History, Washington D.C., U.S.A.;
RMNH – Netherlands Centre for Biodiversity Naturalia (= the Rijksmuseum van Natuurlijke Historie), Leiden, The Netherlands.

Taxonomic part

***Lecithocera breiensis* sp. nov.** (Plate 84 figs 1, 1a-b, 3, 3a-b)

Holotype ♂ RMNH: Bird's Head Peninsula, Warkapi (nr Breie), Primary lowland forest 500 m, at light, 12 xi 1993; INDONESIA, Irian Jaya, coll. A.J. de Boer, A.L.M. Rutten & R. de Vos, gen. slide no. CIS-5992/Park.






Paratype 1♂ RMNH: Wardammen Peninsula, Tanida 17 km S Wasior, at light, 6 xi 1993; Indonesia, Irian Jaya, coll. A.J. de Boer, A.L.M. Rutten & R de Vos.

Derivatio nominis: Toponymic. The species name is derived from the type locality.

Diagnosis: This species is similar to *L. submersa* Diakonoff in the forewing pattern, with fuscous scales densely scattered throughout, a pair of black discal spots in the cell. However, it is much smaller (smaller wingspan than that of *L. submersa* at 16 mm), and the forewing is broadened toward the apex. Differences between male genitalia of the species are also notable.

Description: Male (Plate 84 fig. 1, 1a, 1b). Wingspan, 12 mm. Head orange white on dorsal surface, with brownish scales medially. Pedicel of antenna elongate, brownish dorsally; basal 4-5 segments of flagellum blackish, then light yellow with brown annulations; apical and preapical segment black. Labial palpus (Fig. 1b) with second segment thickened, dorsal margin nearly straight, brownish on outer margin and light yellow on inner margin; 3rd segment slightly shorter than 2nd segment, with acute apex. Tegula brownish dorsally, with black scales anteriorly. Hind tibia slender, without hairs above, apical part brownish. Forewing gradually broader toward distal part; ground color light orange, fuscous scales densely scattered throughout, more dense in distal 1/4; blackish broad basal streak extended to 1/5 length along costa; two discal blackish spots, one before middle and the other at end of cell; apex obtuse; termen slightly concave; fringe dark brown with light orange basal line. Hindwing light orange; fringe concolorous. Female unknown.

Male genitalia: (Plate 84 fig. 3, 3a-b). Gnathos strongly bent beyond middle, with sharply pointed apex. Tegumen with band-like flaps laterocaudally arising from both corners and forming triangular. Costal bar with median expansion. Valva broad at base; cucullus shorter than basal part of valva, costa slightly concave, densely setose in lower half, with more than 15 conic short spines along ventral margin, with a bundle of bristle-like scales in basal ventral corner; basal corner extended anteriorly, forming a finger; outer margin gently rounded; apex rounded; sacculus expended near middle, then narrowed and acute apically. Juxta deeply concave in U-shape on caudal margin (as arrow 1). Phallus stout, shorter than valva, strongly bent at 1/3 on ventral margin, dorsal surface sclerotized, bifurcated apically; with a small, sclerotized, horn-shaped cornutus beyond middle. Abdominal segment VIII is shown in Fig. 3b.

Distribution: Papua, Indonesia (Doberai = Bird's Head Peninsula).

***Aprosoesta laminella* sp. nov.** (Plate 84 figs 2, 2a-b, 4, 4a)

Holotype ♂ USNM: Papua N. Guinea, Madang, Brahman Mission, 200 m, 11-15 x 1992, VO Becker Col.; Col. BECKER, PNG 2986, gen. slide no. CIS-5923/Park.

Derivatio nominis: The species name is derived from Latin "lamina" [plate of leaf], referring to the plate of juxta.

Diagnosis: This new species is superficially similar to *A. eremitatos* Park, 2015, with less maculated wings and color pattern, and a very short 3rd segment of the labial palpus. However, it can be distinguished by its forewing, which lacks distinct white subterminal line and has distinct fuscous spots along the termen from apex to tornus, and by the characteristics of the male genitalia as shown in Figs 4 and 4a.

Description: Male (Plate 84 figs 2, 2a-b). Wingspan 10.5 mm. Head yellowish white, shiny, speckled with brownish scales dorsally; frons yellowish white. Pedicel of antenna slender, light orange dorsally, dark brown ventrally; flagellum yellowish white throughout. (beyond middle broken). Labial palpus (Fig. 2b) with second segment thickened, long, gently arched and recurved, basal 2/5 brownish, then light orange beyond; 3rd segment (Fig. 2a) short, less than 1/4 length of 2nd segment, slightly curved downward. Tegula covered with brownsish scales, fuscous anteriorly. Thorax yellowish white. Forewing ground color creamy white, broad blackish streak extended to 1/4 along costa; quadrate brownish patch before middle on costa, followed by smaller one beyond 2/3; ante- and median fascia not developed; postmedian fascia indistinctly presented, broadly diffused; discal spots obscure; blackish spots presented along termen from apex to tornus; apex obtuse; termen oblique, slightly concave medially, fringe light orange in basal half, dark brown beyond; venation similar to that of *A. eremitatos* Park. Hindwing ground color same as the forewing; blackish discal spot at end of cell; subterminal fascia brownish, arising from 3/4 on costa and extended to tornus; apex acute. Female unknown.

Male genitalia: (Plate 84 fig. 4, 4a). Uncus elongated, with acute apex, about 2/5 the length of tegumen. Gnathos absent. Tegumen with long lateral plate extended anteriorly, anterior margin deeply concave. Valva elongate, exceeding apex of uncus, with heavily sclerotized apical spine; dorsal margin





with heavily sclerotized, digitate process before middle; ventral margin slightly concave near basal 2/5; cucullus with long bristles on surface, dense in lower half on upper ventral margin and sparsely scattered below ventral margin, longer ones in apical part, a row of setae in lower corner of cucullus. Juxta with a pair of long, symmetrical lobes which are slightly shorter than tegumen with caudal margin serrated (as arrow 2); sacculus broadly developed, extended to lower corner of cucullus. Saccus with flat on anterior margin. Phallus simple without lateral process, slightly longer than tegumen.
Distribution: Papua New Guinea (Madang Province).

Check list of Lecithoceridae in New Guinea

Legends: TL – type locality; depositories of type specimens given in square brackets [ ]; ? – means that it is not known where the type specimens are deposited.

Lecithocerinae

Asmenistis Meyrick, 1925
Type species: *Lecithocera cucullata* Meyrick, 1914

semifracta Diakonoff, 1954: 41. TL: Papua, Indonesia [RMNH]

Crinellus Park, 2012
Type species: *Lacuniola eremicus* Park, 2012

eremicus Park, 2012: 220. TL: Madang, PNG [USNM]

Hamatina Park, 2011
Type species: *Hamatina hemitoma* (Diakonoff, 1954)

diakonoffi Park, 2011: 57. TL: Morobe, PNG [USNM]
hemitoma (Diakonoff), 1954: 51. TL: Papua, Indonesia [RMNH]
iriana Park, 2011: 210. TL: Papua, Indonesia [RMNH]
jembatana Park, 2011: 209. TL: Papua, Indonesia [RMNH]
nabangae Park, 2011: 206. TL: Morobe, PNG [USNM]
robdevosi Park, 2011: 209. TL: Papua, Indonesia [RMNH]

Lacuniola Park, 2012
Type species: *Lacuniola hadrorhacha* Park, 2012

hadrorhacha Park, 2012: 220. TL: Morobe, PNG [USNM]

Lecithocera Herrich-Schäffer, 1853
Type species: *Carcina luticornella* Zeller, 1839

autodyas Meyrick, 1929: 525. TL: New Ireland, PNG [?]
biaroensis Park, 2102: 321. TL: Morobe, PNG [USNM]
brachyptila Diakonoff, 1954: 50. TL: Papua, Indonesia [RMNH]
breiensis sp. nov. TL: Papua, Indonesia [RMNH]
brunneibella Park, 2012: 322. TL: Madang, PNG [USNM]
ceratoides Park, 2012: 325. TL: Morobe, PNG [USNM]
coleasta Meyrick, 1918: 103. TL: Sariba Is., PNG [?]
deloma Durrant, 1915: 165. TL: Papua, Indonesia [?]
disperma (Diakonoff, 1954: 39). TL: Papua, Indonesia [RMNH]
fascitiala Park, 2012: 71. TL: Madang, PNG [USNM]
gyrosiella Park, 2012: 323. TL: Morobe, PNG [USNM]
hispidiella Park, 2012: 323. TL: Morobe, PNG [USNM]
inkyuleei Park, 2012: 322. TL: Morobe, PNG [USNM]
lasioides Park, 2012: 325. TL: Morobe, PNG [USNM]
megalosperma Diakonoff, 1954: 58. TL: Papua, Indonesia [RMNH]
niptanensis Park, 2012:71. TL: Morobe, PNG [USNM]
porrectiella Park, 2012: 325. TL: Morobe, PNG [USNM]
prudens Meyrick, 1918: 106. TL: Papaua, Indonesia [?]
pseudolunata Park, 2012: 70. TL: Morobe, PNG [RMNH]
purpurea Diakonoff, 1954: 50. TL: Papua [RMNH]
spinulata Park, 2012: 324. TL: Morobe, PNG [USNM]
squamifera Meyrick, 1929: 525. TL: New Hanover, PNG [?]
staurophora Meyrick, 1931: 81. TL: Mambare, PNG [?]
= *strepsicrena* Meyrick, 1931: 81.
= *spinigera* Diakonoff, 1954: 59.
stelophanes Meyrick, 1938: 514. TL: Mafulu, PNG [?]
stichoides Park, 2011: 324. TL: Morobe, PNG [USNM]
strigosa Durrant, 1915: 165. TL: Papua, Indonesia [?]
sublunata Diakonoff, 1954: 60. L: Papua, Indonesia [RMNH]
submersa Diakonoff, 1954: 59. TL: Papua, Indonesia [RMNH]

Neotimyra Park, 2011
Type species: *Neotimyra senara* Park, 2011

gyriola Park, 2011: 419. TL: Morobe, PNG [USNM]
milleri Park, 2011: 419. TL: Morobe, PNG [USNM]
nemoralis Park, 2011: 420. TL: Madang, PNG [USNM]
senara Park, 2011: 418. TL: Morobe, PNG [USNM]
warkapiensis Park, 2011: 420. TL: Papua, Indonesia [RMNH]

Onnuria Park, 2011
Type species: *Onnuria .xanthochroa* Park, 2011

arfakana Park, 2011: 58. TL: Papua, Indonesia [RMNH]
depaprensis Park, 2011: 58. TL: Papua, Indonesia [RMNH]
melanotoma Park, 2011: 158. TL: Morobe, PNG [USNM]
tenuiella Park, 2011: 160. TL: W. Highlands, PNG [USNM]
xanthochroa Park, 2011: 156. TL: Morobe, PNG [USNM]

Pectimimura Park, 2008
Type species: *Pectinimura montiatilis* Park, 2008






areola Park, 2011: 46. TL: Morobe, PNG [USNM]
baryoma (Diakonoff, 1954: 53). TL: Papua, Indonesia [RMNH]
brahmanica Park, 2011: 47. TL: Madang, PNG [USNM]
gilvicostata Park, 2011: 48. TL: Morobe, PNG [USNM]
singularis Park, 2011: 45. TL: Morobe, PNG [USNM]

Sarisophora Meyrick, 1904
Type species: *Sarisophora leptoglypta* Meyrick, 1904
beckerina Park, 2012: 10. TL: Morobe, PNG [USNM]
cyanostigmatis Park, 2012: 14. TL: Morobe, PNG [USNM]
designata Park, 2012: 11. TL: Morobe, PNG [USNM]
hadroides Park, 2012: 10. TL: Morobe, PNG [USNM]
melanotata Park, 2012: 11. TL: Morobe, PNG [USNM]
notornis Park, 2012: 11. TL: Morobe, PNG [USNM]
praecentrix Meyrick, 1931: 78. TL: Hydrographer Mts., PNG [?]
pyrrhotata Park, 2012: 10. TL: Morobe, PNG [USNM]
tamiodes Meyrick, 1910: 445. TL: Sudest Is. & St. Aignan Is. PNG [?]

Scolizona Park, 2011
Type species: *Lecithocera rhinoceros* Diakonoff, 1954

palinoides Park, 2011: 309. TL: Morobe, PNG [USNM]
rhinoceros Diakonoff, 1954: 47. TL: Papua, Indonesia [RMNH]
ulniformis Park, 2011: 309. TL: Morobe, PNG [USNM]

Strombiola Park, 2011
Type species: *Strombiola papuana* Park, 2011

papuana Park, 2011: 421. TL: Morobe, PNG [USNM]

Sulciolus Park, 2012
Type species: *Lecithocera pachystoma* Diakonoff, 1954

abrasa (Diakonoff), 1954: 46. TL: Papua, Indonesia [RMNH]
capra (Diakonoff), 1954: 48. TL: Papua, Indonesia [RMNH]
circulivalvae Park, 2012: 300. TL: Morobe, PNG [USNM]
induta (Diakonoff), 1954: 49. TL: Papua, Indonesia [RMNH]
kaindiana Park, 2012: 300. TL: Morobe, PNG [USNM]
pachystoma Diakonoff, 1954: 57. TL: Papua, Indonesia [RMNH]
perpicua Diakonoff, 1954: 56. TL: Papua, Indonesia [RMNH]

Telephata Meyrick, 1916: 592.
Type species: *Telephata cheramopis* Meyrick, 1916

cheramopis Meyrick, 1916: 593. TL: Yule Isl., PNG [?]
nitens (Diakonoff), 1954: 45. TL: Papua, Indonesia [RMNH]
ferruginula Park, 2011: 85. TL: Western Highlands, PNG [USNM]
melanista Park, 2011: 84. TL: Morobe, PNG [USNM]

Torodorinae
Thubana Walker, 1864
Type species: *Thubana bisignatella* Walker, 1864: 814.

brunalis Park, 2016: 148. TL: Papua, Indonesia [RMNH]

Torodora Meyrick, 1894
Type species: *Torodora characteris* Meyrick, 1894: 16.

wauensis Park, 2010: 405. TL: Morobe & Madang, PNG [USNM]

Crocanthinae
Aprosoesta Turner, 1919
Type species: *Aprosoesta pancala* Turner, 1919

cordispina Park, 2015 TL: Madang, PNG [USNM]
cyclopsana (Park, 2011: 784). TL: Papua, Indonesia [RMNH]
eremitatos Park, 2015: 286. TL: Papua, Indonesia [RMNH]
gatoralis (Park, 2011: 784). TL: Papua, Bird's Head Peninsula [RMNH]
heliograpta Meyrick, 1929: 520. TL: Papua, Dampier Is [BMNH]
laminella sp. nov. TL:Madang, PNG [USNM]
pancala Turner, 1919: 151. TL: Queensland, Australia [ANIC]
poliozona (Park, 2011: 782). TL: Madang, PNG [USNM]
strombiana Park, 2015: 257. TL: Morobe, PNG [USNM]
subpancala Park, 2015: 254. TL: Madang, PNG [USNM]
vinnula Park, 2015: 257. TL: Madang, PNG [USNM]
warmarensis (Park, 2011: 784). TL: Papua, Bird's Head Peninsula [RMNH]

Crocanthes Meyrick, 1886
Type species: *Crocanthes prasinopis* Meyrick, 1886
= *Sphenocrates* Meyick, 1925
Type species: *Crocanthes aulodocha* Meyrick, 1918

anactostola Diakonoff, 1954: 27. TL: Papua, Indonesia [RMNH]
aulodocha Meyrick, 1918: 98. TL: Papua, Indonesia [RMNH?]
crypsicola Durrant, 1915: 165. TL: Papua, Indonesia [BMNH]
fallax Durrant, 1915: 164. TL: Papua, Indonesia [BMNH]
= *monodesma* Meyrick, 1931: 73.
gracilosa Park, 2015: 261. TL: Madang, PNG [USNM]
hagenensis Park, 2015: 266. TL: Madang, PNG [USNM]
leucodonta Diakonoff, 1954: 27. TL: Papua, Indonesia [RMNH]
prasinopis Meyrick, 1886: 277. TL: E. Australia [BMNH]
sidonia Meyrick, 1910: 442. TL: St. Aignan Is., Sariba Is., Queensland [BMNH]






susuensis Park, 2015: 265. TL: Madang, PNG [USNM]
temeraria Meyrick, 1910: 443. TL: Morseby, PNG [?]
[not grouped] Park (2015) grouped *Crocanthes* into 4 species-groups, but following 9 species were not included in the groups and left in "not-grouped"
celema Durrant, 1915: 152. TL: Papua, Indonesia [BMNH]
hecuba Meyrick, 1931: 74. TL: PNG [BMNH]
phoenoteles Meyrick, 1929: 519. TL: Kumusi R., PNG [BMNH]
platycitra Meyrick, 1931: 73. TL: Biagi, PNG [BMNH]
rhodantha Meyrick, 1918: 97. TL: Papua, Indonesia [BMNH?]
scioxantha Meyrick, 1910: 443 TL: Papua, Indonesia [BMNH]
symmochlopa Meyrick, 1929: 519. TL: New Mecklenburg. PNG [BMNH]
= *triglenopa* Meyrick, 1929: 520.
thalamectis Meyrick, 1929: 521. TL: Kumusi Riv., PNG [BMNH]
xanthistia Meyrick, 1931: 73. TL: Papua, Indonesia [BMNH]

Gonaepa Walker, 1866
Type species: *Gonaepa josianella* Walker, 1886

actins Walsingham, 1915: 149. TL: Papua, Indonesia, Snow Mts [RMNH?]
cordata Park, 2016: 677. TL: Leyte, Philippines [MHUB]
dysthyma Diakonoff, 1954: 38. TL: Papua, Indonesia [RMNH?]
josianella Walker, 1866: 1840. TL: New Guinea [?]
heliarcha Meyrick, 1886: 278. TL: Port Moresby, PNG [?]
nagaensis Park, 2016: 677. TL: Luzon, Naga, Philippines [MHUB]
ochrorhytisma Park, 2016: 677. TL: Samar, Philippines [MHUB]
pyrochorda Meyrick, 1910: 442. TL: New Guinea [BMNH]
phaeograpta (Meyrick, 1931: 75). TL: Kumusi R., PNG [?]

Hannara Park, 2013
Type species: *Hannara buloloensis* Park, 2013

buloloensis Park, 2013: 220. TL: Papua New Guinea, Bulolo [USNM]
gentis Park, 2013: 220. TL: Papua, Indonesia, Lorentz [RMNH]

Lamprista Park, 2013
Type species: *Lamprista emmeli* Park, 2013

emmeli Park, 2013: 595. TL: Madang, PNG [USNM]
hemipyra Meyrick, 1938: 513. TL: Kokoda, PNG [BMNH]
ortholepida Park, 2013: 597. TL: Madang, PNG [USNM]

Pacificulla Park, 2013
Type species: *Pacificulla flaviagera* Park, 2013

callisomata Park, 2013: 73. TL: Papua, Indonesia [RMNH]
carcharias (Meyrick, 1910: 440). TL: Papua, Indonesia [BMNH]
cervicalis Park, 2013: 74. TL: Papua, Indonesia [RMNH]
cleomorpha (Meyrick, 1931: 74). TL: Hydrographer Mts., PNG [BMNH]
esdiparki Park, 2013: 69. TL: PNG [USNM]
eurypyra (Meyrick, 1918: 9). TL: Papua, Indonesia [BMNH]
flaviagera Park, 2013: 68. TL: Madang, PNG [USNM]
gelastis (Meyrick, 1918: 97). TL: Papua, Indonesia [BMNH]
geniola (Meyrick, 1931: 74). TL: PNG [BMNH]
heliocharis (Diakonoff, 1954: 32). TL: Papua, Indonesia [RMNH]
ignea (Meyrick, 1925: 429). TL: Papua, Indonesia [BMNH]
ignigera Meyrick, 1938: 513. TL: Mafulu, PNG [BMNH]
kekamatana Park, 2013: 76. TL: Papua, Indonesia [RMNH]
megalophthalma (Diakonoff, 1954: 30). TL: Papua, Indonesia [RMNH]
miltina (Durrant, 1915: 151). TL: Papua, Indonesia [BMNH]
philotima (Diakonoff, 1954: 33). TL: Papua, Indonesia [RMNH]
= *xanthorrhoea* Diakonoff, 1954: 27.
protoma (Diakonoff, 1954: 27). TL: Papua, Indonesia [RMNH]
pyrostola (Diakonoff, 1954: 31). TL: Papua, Indonesia [RMNH]
sceptrophora (Diakonoff, 1954: 28). TL: Papua, Indonesia [RMNH]
searsi Park, 2013: 71. TL: Gulf Prov., PNG [USNM]
thermocharis (Meyrick, 1931: 75). TL: Kumusi Riv. PNG [?]
thrasydora (Meyrick, 1910: 444). TL: Papua, Indonesia [BMNH]

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Peculiarities of the butterfly fauna of South-East Sulawesi

Peter H. Roos

Goethestraße 1a, D-45549, Sprockhövel, Germany; e-mail: peter.h.roos@t-online.de

Abstract: The complex structure and geological history of Sulawesi renders this island an ideal object for zoogeographical studies on butterflies and their evolution. Based on the faunal composition and species endemicity, Sulawesi can be subdivided into several regions (Vane-Wright & de Jong 2003). Unfortunately, the state of knowledge concerning the butterfly fauna differs substantially between these regions, East and SE Sulawesi being particularly under-represented. Therefore, I will focus here on the less explored southeastern peninsula, Sulawesi Tenggara, and try to carve out some peculiarities of this region with respect to butterflies. SE Sulawesi harbours several unique species and subspecies such as *Lohora umbrosa* and *Zethera incerta tenggara* and also species which are extremely rare on Sulawesi such as *Semanga helena*, *Deudorix loxias* and *Euthalia aconthea*. On the other hand, a number of species occurring in other parts of Sulawesi are missing in the southeast: *Atrophaneura dixoni* Grose-Smith, 1901, *Charaxes mars* Staudinger, 1885 and *Cyrestis heracles* Staudinger, 1896 are examples. A notable feature in SE Sulawesi of many butterfly species from different families is the trend for darker wing coloration compared to populations from other parts of the island. It is attempted here to quantify this phenomenon and to provide respective, reproducible methods for its analysis. This has been done for example for several species of the Pierid genus *Eurema* Swainson, 1821 and for the Nymphalid species *Cyrestis strigata* Felder et Felder, 1867, *Neptis ida* Moore, 1858 and *Lexias aeetes* Hewitson, 1861. The above mentioned peculiarities will be finally discussed in a zoogeographic context.

Key words: Sulawesi, Sulawesi Tenggara, Pieridae, Lycaenidae, Nymphalidae.

Introduction

The butterfly fauna of Sulawesi was intensely studied in the 19th and early 20th centuries, connected with names such as the famous Alfred Russel Wallace and Ludwig Martin. After a gap of many decades, more comprehensive recent investigations were performed in 1978 and 1985 by "Operation Drake" as part of a world-wide program organized by the Scientific Exploration Society (Blashford-Snell 1981) and by "Project Wallace" organized by the Royal Entomological Society of London (Knight 1988; Knight & Holloway 1990). However, these explorations were restricted to relatively small parts of the large island, i.e. Morowali district in Central Sulawesi and Bogani Nani Wartabone (former Dumoga-Bone) in North Sulawesi, respectively. Hence, large areas of Sulawesi remained, and remain, largely unexplored, such as the southeastern and eastern peninsula as already mentioned by Vane-Wright & de Jong (2003). The author's own investigations over the last 20 years, of the less known butterfly fauna of the southeastern part of Sulawesi, were undertaken to fill the gaps of knowlewdge. Successively, these investigations have brought forward the entomo-faunistic peculiarities of this part of the island and lead to the notion that it forms a specific biogeographic entity within Sulawesi, together with the large south-eastern offshore islands such as Buton and Muna (Roos 1993, 1995, 2000, 2005). The following aspects concerning the butterfly fauna of Southeast Sulawesi (SE Sulawesi) will be treated here: the occurrence of rare or unique species or subspecies, first records for SE Sulawesi, the obvious absence of species which are present in other parts of the island and the parallel evolution of certain character traits in different species. Finally, zoogeographic aspects such as the relationship between SE Sulawesi and the large adjacent islands Buton and Muna will be discussed.

Materials and methods

For the analysis of wing patterns and for morphometric determinations the FIJI software





was used (Abramoff et al. 2004). The functions 'straight line' and 'polygon selection' were applied to determine lengths and areas, respectively. The 'rectangular selection' was used to define areas for intensity measurements. Absolute length and area values in mm and mm^2 were normalized to account for differences in the size of butterflies. For normalization, forewing length or total forewing area are used, for example. Other suitable parameters will be indicated. Calculations were done with Microsoft Excel. For the graphical presentation of bar diagrams, box plots and functions GraphPad Prism was used. Student's T-test was applied to calculate statistical significance.

Particular butterfly species and subspecies from Sulawesi Tenggara

This section discusses the occurrence of species and subspecies which are either generally rare and very locally distributed on Sulawesi, or are specific / endemic for the southeast peninsula.

Rare and new encounters for Sulawesi Tenggara

***Deudorix loxias* Hewitson, 1863 (Lycaenidae)** (Plate 85 figs 1,4)

D. loxias - often misspelled as *loxius* - is an endemic Lycaenid of Sulawesi. It appears to be very rare on the entire island as mentioned by Röber (1939). This notion also reflects the current picture as there are only few specimens in museum collections and there is little known on the distribution, biology and ecology of the species (Muller & Tennent 2011). Recently, *D. loxias* has been recorded from Buton island to the south of Sulawesi Tenggara. Now, I can add 'Kolaka' as a new locality in the latter province where I found this species in 2015. Altogether 3 female specimens were sighted (Plate 85 figs 1,4) in March 2015 within dense and deep forest about 8 km east of Kolaka at an altitude of roughly 400 m. The specimens were observed within a small area on a transect of about 50 m and were not seen elsewhere in the surrounding area. They were flying 1 to 2 m above the ground and settled on leaves.
In summary, the occurrence of *D. loxias* in SE Sulawesi has been proven for the first time. The species belongs to the rarest butterflies of Sulawesi Tenggara and also of entire Sulawesi. *D. loxias* appears to form very local populations restricted to small patches within the forest. More observations are needed to find out the pecularities of these patches considering aspects such as micro-climate and floral composition. It is noted that the Lycaenid *Arhopala argentea* Staudinger, 1888 shows similar distribution behaviour. The species does not occur in the *D. loxias* habitat but inhabits close-by forest areas at altitudes about 50 to 100 m higher. Also for *A. argentea*, more observations are required to define the ecological needs of the species.

***Semanga helena* Röber, 1887 (Lycaenidae)**
S. helena was originally described by Röber (1887) from the Banggai Archipelago, located in the Tomini Bay of East Sulawesi, based on an unstated number of specimens. However, the species appears to be rare on Banggai as well as Peleng, the largest island of the Banggai Archipelago, as neither Nieuwenhuis (1946) nor Detani (1983) could find the species there. The presence of *S. helena* on Sulawesi mainland was shown first time by Tennent (2005) based on 2 specimens which originate from North and Central Sulawesi. A third specimen, a female, was thereafter detected on 01.IV.2009 in SE Sulawesi in the forests about 20 km east of Kolaka (Roos 2016). Thus, the three specimens of *S. helena* known from Sulawesi mainland so far originate from three different locations which are far away from each other. In conclusion, it can be stated that *S. helena* is one of the rarest butterfly species of Sulawesi.
Unfortunately, comprehensive treatments of the entire family Lycaenidae from Sulawesi do not exist. Distribution data for most species are lacking and, generally, little is published on this butterfly group from Sulawesi, an exception being revisions published by Alan Cassidy on the genera *Nacaduba* Moore, 1881 and of the *Lycaenopsis*-group and the tribe Miletini (Cassidy 1990; 1995a; 1995b). Therefore, some further interesting Lycaenidae species will be listed and discussed shortly in the following section. None of these species has been reported before from SE Sulawesi.

***Hypothecla honos* de Nicéville, 1898** (Plate 85 figs 2, 5)
The genus *Hypothecla* Semper, 1890 includes only two species (Fruhstorfer 1912) which are obviously rare (Vane-Wright & de Jong 2003). One of the species, *H. honos*, is endemic for the Sulawesi region and has been described by de Niceville (1898) from specimens collected by Fruhstorfer in Toli-Toli in North Sulawesi. Röber (1939) mentions the species from North and Central-Sulawesi without giving exact locations. There are no records for SE Sulawesi (Jurriaanse & Lindemans 1920) nor for Southwest Sulawesi (Piepers & Snellen 1878).






In March 2013, I found the species very localized in Porabua (19/20.III) and in Konawendepiha (16/17.III), both places located in the district Uluiwoi. Altogether 5 specimens were recorded. As Sulawesi Selatan is well explored, I suspect that *H. honos* is restricted in the South of Sulawesi to the southeastern peninsula.

***Jamides latimargus* Snellen, 1878**

During altogether nine field trips to SE Sulawesi I recorded this species only once. It was found in the vicinity of Konawendepiha (district Uluiwoi) in March of 2013. The species status of *latimargus* is not clear. Originally the taxon was described by Snellen as *Cupido latimargus* (Piepers & Snellen, 1878) from material which originated from Southwest Sulawesi, namely Amparang, Bonthain, Maros and Takalar. Later, *latimargus* was treated as subspecies either of *J. elpis* Godart, 1824 (Röber 1939) or of *J. alecto* Felder, 1860 (Vane-Wright & de Jong 2003) while Hirowatari (1992) gives it species status as *Jamides latimargus*. D'Abrera (1986) does not at all mention *latimargus*. I will leave the question on the taxonomic status open but follow Hirowatari (1992) as there are substantial differences in wing size and wing colour pattern between *J. latimargus* and *J. alecto*. Interestingly, *Lampides kondulana espada* Fruhstorfer, 1915 was recently recognized as a subspecies of *J. alecto* (Cassidy, 2013). The type material comes from North Sulawesi, Minahassa (Lectotype) and more interestingly also from Southwest-Sulawesi, Bua-Kraeng (paralectotype), from where also *latimargus* was described. The male lectotype figured by Cassidy (2013) is clearly different from the specimen of *J. latimargus* shown here (Plate 85 figs 3, 6). There are no published records for *latimargus*, *alecto* or *elpis* in South-east Sulawesi so that the specimen from Konawendepiha in SE Sulawesi appears to be the only one known so far of *J. latimargus* from that region.

***Jamides snelleni* Röber, 1886**

The occurrence of *J. snelleni* in SE Sulawesi has been discussed recently (Roos 2016). The species is endemic for Sulawesi and it is generally rare. Vane-Wright & de Jong (2003) give only South Sulawesi as distribution range for *J. snelleni* although Röber (1939) also mentions Tombuku in East Sulawesi as location. However, there were no previous reports of *J. snelleni* from SE Sulawesi until a single population was discovered there in 2002 in the vicinity of Sambeani, district Abuki (Roos 2016).

***Jamides fractilinea* Tite, 1960** (Plate 85 figs 7, 10)

J. fractilinea is endemic for the Sulawesi region which harbours two subspecies, nominate ssp. *fractilinea* from Sulawesi and ssp. *saraharum* Rawlins, Cassidy, Müller, Schröder et Tennent, 2014 from Mangole Island (Sula Islands) (Rawlins et al. 2014). As there are no definite reports for *J. fractilinea* from Sulawesi Tenggara, the species will be shortly discussed here. The holotype of *J. fractilinea* orginates from Makassar in Southwest Sulawesi (Tite 1960). Most of the material further examined by Tite (1960) also comes from this province namely from the following locations: Pic de Bonthain, Maros, Tjamba, Samanga, Lompa Battau and Bua-Kraeng (names spelled as in the original work). In addition one male each from Toli-Toli, North Sulawesi and from Mangole Island were examined. Hirowatari (1992) and Vane-Wright & de Jong (2003) restrict the distribution range of the species to Southwest Sulawesi. I could detect the species at various places and in several years in SE Sulawesi as follows: 20 km East of Kolaka, 12.X.2005, 30 and 31.III.2009, 17. and 20.III.2011, 24.III.2013; Sambeani, 11.X.2002; Porabua, 11.III.2011, 18 and 20.III.2013. At each date, one or sometimes two specimens were recorded making up a total number of twelve only.

***Amblypodia narada* Horsfield, 1829**

The species is widespread in Southeast Asia including islands such as Sumatra, Java, Borneo and the Philippines (Bethune-Baker 1903; Fruhstorfer 1907; D'Abrera 1986). Riley (1922) recognized that *A. narada* also occurs on Sulawesi as he identified a specimen from Makassar among *Amblypodia annetta* Staudinger, 1888 in the collection of BMNH. Based on differences in wing markings he separated it from populations of other islands as ssp. *confusa* Riley, 1922. There is only little further faunistic information regarding *A. narada* from Sulawesi. Fruhstorfer (1907) mentions it from Sula Mangole-Island located in the most eastern part of the Sulawesi region. However, the source of this information remains obscure. Alan Cassidy (2011) figured an image of *A. narada confusa* from Dumoga Bone in North Sulawesi on the internet. In conclusion, only South-west Sulawesi and North Sulawesi can be regarded as assured distribution areas of *A. narada* on Sulawesi based on literature data. There is a new record now from Porabua in SE Sulawesi (12.III.2011, P. Roos). The respective specimen shows the reduced dark blue area on the wing uppersides which is characteristic for ssp. *confusa* (Plate 85 figs 8, 11).





The genus *Dacalana* Moore, 1884

The genus comprises more than 20 different species of which three occur in the Sulawesi region and two on Sulawesi itself, *Dacalana anysis* Hewitson, 1865 and *Dacalana anysides* Röber, 1887. Obviously little is known on the distribution of both species in the different provinces of Sulawesi. The genus *Dacalana* is not mentioned by Jurriaanse & Lindemans (1920) from Sulawesi Tenggara.

***Dacalana anysis* Hewitson, 1865**

While Vane-Wright & de Jong (2003) give Sulawesi generally as the distribution range for *D. anysis,* Röber (1939) restricts this somewhat mentioning only South and North Sulawesi. Originally the species was described from Makassar (Hewitson 1865) and later Holland (1891) lists the species as taken also in Southwest-Sulawesi. The occurrence of D. anysis in SE Sulawesi is proven by the specimen shown on plate 85 figs 9 & 12. It was taken in Konawendepiha, district Uluiwoi, on 10.III.2011.

***Dacalana anysides* Röber, 1887**

The species description is founded on a single male taken in Gorontalo which is located in North Sulawesi - not East Celebes as stated by the author (Röber 1887). Its occurrence there was confirmed during Project Wallace by Cassidy (pers. comm.). Ribbe (1926) describes the ssp. *birui* from Kalawara, West-Sulawesi under the name *Camena anysides birui*. The subspecies is distinguished from the nominotypical form by extended blue coloration in particular of the hindwing. Strange to say that the taxon is not considered by subsequent authors, for example Röber (1939), D'Abrera (1986) and Vane-Wright & de Jong (2003). Instead, D'Abrera (1986) figures specimens from the northern part of West-Sulawesi (Palu) under *D. anysides anysides*. There are obviously no published records for *D. anysides* from SE Sulawesi. A single male shown in plate 86 figs 1, 4 was found at the small Silui River close to Porabua on 20.III.2013 and is the only proof of the occurrence of the species in Sulawesi Tenggara.

***Arhopala argentea* Staudinger, 1888** (Plate 86 figs 2-3, 5-6)

Typical *A. argentea* come from Minahassa in North Sulawesi (Staudinger 1888), and Röber (1939) states that it is rare in that region. In 1897 Grose-Smith described the same species as *Arhopala clarissa* based on material from South Sulawesi (Grose-Smith 1897) so that the distribution area can be summarized as North and South Sulawesi (Bethune-Baker 1903). Again, there are no published records from SE Sulawesi. In March 2011, a population of *A. argentea* was discovered within montane forest about 20 km east of Kolaka at an elevation of about 500 m. The continuance of the population has been confirmed in 2013 and again in 2015. As already mentioned above (see under *Deudorix loxias*) the species appears to inhabit localized patches within the forest. The ecological reasons for the restriction are not known.

***Euthalia aconthea* Cramer, 1777 (Nymphalidae)**

The discovery of *E. aconthea* in Sulawesi Tenggara in 2002 has been described earlier (Roos 2005). To the best of my knowledge, the specimen of *E. aconthea* found near Kolaka (Plate 86 figs 7-8) is the only one known from SE Sulawesi so far. Only three further specimens have been found in Sulawesi in the Southwest Province (Sulawesi Selatan) (Müller 1994). Outside Sulawesi, *E. aconthea* inhabits a large area in south and south-east Asia (Corbet 1945; Tsukada 1991). Thus, the location at Kolaka forms the most eastern one where the species obviously meets its ecological limits. This concerns also the entire genus *Euthalia* which is represented on Sulawesi by only two species, *E. aconthea* and *E. amanda* Hewitson, 1862. The latter obviously occurs throughout all parts of Sulawesi and also on the Banggai Islands in the east of the Sulawesi region (Tsukada 1991; Vane-Wright & de Jong 2003). The only *Euthalia* species expanding further into the East is *E. amabilis* Staudinger, 1896 which occurs on Sula (Mangole Island), the most eastern outpost of the genus when the Papuan *Euthaliopsis aetion* Hewitson, 1862 is considered phylogenetically distinct from *Euthalia* (see Parsons 1999).

Species or subspecies unique for SE Sulawesi

***Zethera incerta tenggara* Roos, 1992 (Nymphalidae: Satyrinae)**

The genus *Zethera* Felder, 1861 is represented in South-East Sulawesi by a very distinct form which was discovered in 1990 some 20 kilometers east of Kolaka and later tentatively described as a subspecies of *Zethera incerta* Hewitson, 1861 (Roos 1992). The species was formerly believed to be restricted to the northern parts of Sulawesi and, thus, geographically closely connected to its congeneric species inhabiting the Philippine islands. While the latter harbor five different species, only the endemic *Z. incerta* is known from Sulawesi. At the first sighting, the specimens observed in their






habitats in Sulawesi Tenggara were believed to be Danaidae based on the typical gliding flight and on the similar wing pattern. So it was a surprise when the collected specimens turned out to be a *Zethera* species of the Nymphalid subfamily Satyrinae which significantly differs from the nominotypical northern populations as detailed in the original description of *Z. incerta tenggara* by Roos (1992) and demonstrated by figures (Plate 87 figs 1, 3).

The unique subspecies was subsequently also found at Moramo about 75 south of Kendari by K. Willmott in September 2000 during "Operation Wallacea" (http://www.flmnh.ufl.edu/butterflies/neotropica/sulawesi/checklist.html). In addition to the type locality about 20 km east of Kolaka, ssp. *tenggara* could also be observed in the vicinity of Sambeani in the mountainous regions to the north of the line Kolaka – Kendari. Field studies at further locations northwards of Sambeani such as Asenua, Tawangga and in particular Porabua could not prove the occurrence of ssp. *tenggara* there. However, a population was was discovered recently in Konawendepiha (15.III.2013, P. Roos) which thus constitutes the most northern location from where ssp. *tenggara* is known so far. The exact northern distribution limits and possible contact zones with the nominate subspecies are not known up to now. A specimen from the Luwuk district in East Sulawesi has been assigned to the ssp. *tenggara* and figured, but appears to be intermediate between the nominate form and ssp. *tenggara* with respect to the intensity of yellow coloration and the row of hindwing ocelli (http://www.neutron.phys.ethz.ch/Lepidoptera/ Satyrinae-misc.htm). More information is needed on the populations in Sulawesi Tengah.

Vane-Wright & Smiles (1975) have discussed mimicry relationships between species of the genus *Zethera* and of the subfamily Danainae. They doubt that there is a definite mimic counterpart for *Z. incerta* as has been suggested by Fruhstorfer (1909) who considers *Ideopsis vitrea* Blanchard, 1853 as a suitable model. While *I. vitrea* only marginally resembles *Z. incerta tenggara* it shows significantly larger congruence in the wing patterns with the northern nominate subspecies *Z. incerta incerta*, as depicted by plate 87 figs 3, 4. On the forewings of both species cells M3, CuA1 and CuA2 are white while light areas closer to the wing margin are yellow coloured. A similar distribution between white and yellow areas is found also on the hindwings. The clear indentations of the brown marginal wing markings on both forewings and hindwings of *Z. incerta* are also mimicked by *I. vitrea*.

For ssp. *tenggara*, I propose *Ideopsis juventa* Cramer, 1777 (Plate 87 fig. 2) as a possible mimicry partner. It appears to be an efficient model not only based on the wing pattern but also because it is rather abundant in the *Z. incerta tenggara* habitats near Kolaka and Sambeani. In contrast, *Ideopsis vitrea* is less common here. In conclusion, *Z. incerta* obviously exploits two different *Ideopsis* species for its self-protection dependent on the subspecies under consideration.

There are a number of open questions concerning *Z. incerta* and its subspecies *tenggara*:

(1) Where are the distribution limits for both taxa and where are the contact zones?
(2) Might ssp. *tenggara* constitute a good species distinct from *Z. incerta*?
(3) What are the phylogenetic relationships between the two taxa from Sulawesi in relation to the Philippine species?

Martin (1929) states that the occurrence of *Z. incerta* is restricted to the northern parts of Sulawesi and that it is missing from the two southern peninsulas. He assumes that the southern distribution limit may run north of the Gulf of Bone. The map of Aoki et al. (1982) additionally excludes the eastern peninsula but includes the northern parts of Sulawesi Selatan although there are no concrete data from the latter area. Only Palopo located at the north-western part of the Bone Gulf is mentioned. Thus, there is a large geographical and knowledge gap between the most northern ssp. *tenggara* populations and the southernmost ssp. *incerta*. Investigation of this 'terra incognita' would reveal

(1) whether the genus *Zethera* is represented here,
(2) whether there is a clear-cut division between *incerta* and *tenggara* or
(3) whether there is a transitional zone with interbreeding populations eventually resulting in clinal variation.

Specimens of *Z. incerta* from South-East Sulawesi generally show darker wing patterns than their counterparts from other areas in Sulawesi, a feature which is shared by numerous other butterfly species as will be shown below. It appears to be characteristic and to be a general trend at least for butterflies of this region.

Lohora umbrosa Roos, 1997 (Nymphalidae)

L. umbrosa has been described from SE Sulawesi





(Roos 1997) and so far as I know it is unique for that part of the island. According to my observations, *L. umbrosa* is a very local insect and only rarely encountered within its habitats. Usually, only single specimens can be observed during a day in the field in contrast to *Lohora transiens* Fruhstorfer, 1908 which is very common in the same forest habitats with *Selaginella* spec. as undergrowth. Presumably Selaginellas represent the foodplants of the *Lohora* caterpillars as has been shown to be the case for other Satyrinae of the genera *Ragadia*, *Acrophthalmia* and *Euptychia* (Singer et al. 1971; Fukuda 1983; DeVries 1986; Miller & Miller 1988). Apart from the type-locality Sambeani, *L. umbrosa* is also known from Porabua, located northwest of Sambeani (Roos, March 2011), and has also been found recently at the eastern side of Sulawesi Tenggara in the vicinity of Kendari (Roos, March 2015).

L. umbrosa constitutes the SE Sulawesi representative of the subgenus *Physcon* which mostly includes species with dark brown wing colours. *Lohora decipiens* Martin, 1929 is probably closely allied to *L. umbrosa* as substantiated by wing colour pattern and the structure of the male genitalia (not shown) but clearly, the upperside and underside wing colours of *L. umbrosa* are much darker than those of *L. decipiens* (Plate 87 figs 5-8) (Roos 1997). The hindwings of *L. umbrosa* are nearly uniformly dark brown. Obviously, *L. umbrosa* constitutes the species with the darkest wing pattern within the genus. It is assumed that *L. decipiens* and *L. umbrosa* represent sister-species (under investigation) inhabiting clearly separated areas within Sulawesi, i.e. North / Cental Sulawesi and SE Sulawesi, respectively.

Polyura attalus Felder et Felder, 1867 / *Polyura athamas* Staudinger, 1886 (Nymphalidae)

Green-coloured species of the *athamas*-group of the genus *Polyura* Billberg, 1820 are obviously rare in Sulawesi. Until recently, only a few specimens of *Polyura alphius* Staudinger, 1886 were known from Sulawesi Selatan. Vane-Wright & de Jong (2003) assume that on Sulawesi the species is restricted exclusively to the South. Surprisingly, a population of a green-coloured *Polyura* was discovered recently in SE Sulawesi. It was found in the vicinity of Porabua in March 2009 and its occurrence in the area was subsequently confirmed as follows: Porabua (March 2011), Konawendepiha (March 2011 and 2015), Andamao (March 2015). Interestingly, however, the specimens do not belong to *P. alphius* but to a different species. From neighbouring islands such as Borneo, Java and Sumatra, *Polyura athamas* is known (D'Abrera 1984; Otsuka 1988). According to the recent revision of the *athamas*-group by Toussaint et al. (2016), however, who also used DNA sequence data for phylogenetic analyses, the species *P. athamas* occurs in mainland South-east Asia only while it is replaced on the Indonesian islands by *P. attalus* which was given species status by the authors. So, the *Polyura* populations from SE Sulawesi will be tentatively assigned here to *P. attalus* as their belonging to *P. athamas* is less probable. A detailed analysis will clarify its taxonomic assignment (Roos, in preparation). A representative specimen is shown on plate 86 figs 9-10. Albeit, the presence of a *'non-alphius'* Polyura in Sulawesi Tenggara in addition to *P. alphius* is zoogeographically highly interesting because it creates an unusual distribution pattern for this *Polyura*, i.e. a discontinuous area interrupted from west to east by *P. alphius* in Southwest-Sulawesi.

Parthenos sylvia ornatrix Tsukada, 1991 (Nymphalidae)

This is a further peculiarity of SE Sulawesi as subspecies *ornatrix* is exclusively found in that province and as the other parts of Sulawesi are inhabited by an additional unique subspecies of *Parthenos sylvia* Cramer, 1776, namely ssp. *salentia* Hopffer, 1874 (Roos 2012). The differences between the two subspecies in wing coloration but in particular in wing shape raise the question that they may represent two different species. The contact zones or eventually overlapping areas of the two subspecies are not known so far but can be assumed in the northern parts of Sulawesi Tenggara. Their discovery may help to answer these open questions. As *P. sylvia ornatrix* also occurs on Buton Island, this taxon is a good example for the zoogeographically specific connection between mainland SE Sulawesi and its southern offshore islands. Further examples for this distribution type will be discussed below.

Cirrochroa recondita Roos, 1996 (Nymphalidae)

SE Sulawesi bears an endemic species of the genus *Cirrochroa*, *C. receondita,* which is similar to *Cirrochroa eremita* Tsukada, 1985, as already described by Roos (1996). Since its description in 1996 more material has been examined confirming its specificity. This concerns in particular the male wing span which is the smallest within the Sulawesian *Cirrochroa* species. Besides that, *C. recondita* exhibits the darkest coloured wing pattern among the allied *Cirrochroa* from Sulawesi,






such as *C. thule* Felder et Felder, 1860 and *C. eremita*. This property of *C. recondita* has not been analysed in detail but leads over to the next section in which the general trend in wing pattern darkening in butterflies from SE Sulawesi will be highlighted. The northern distribution limits of *C. recondita* have yet to be defined. My own investigations in the eastern parts of Sulawesi Tengah did not reveal the presence of *C. recondita*; instead *C. thule* was found locally common there.

The dark coloration trend in wing patterns

Within the large and intricately structured island of Sulawesi many butterfly species exhibit geographical variation which gave reason to description of subspecies. Definitely, the study of this regional variation will allow conclusions on zoogeographical and evolutionary aspects. Little, however, is known on distinctive colour pattern characters of the butterfly populations from SE Sulawesi compared to those of the other parts of the island. Inspection of material of numerous species revealed that there appears to be a trend for darker wing coloration in butterfly specimens/ populations from SE Sulawesi. In some cases, this part of the island harbours even the most 'melanotic forms' within the Sulawesi region as it is defined by Vane-Wright & de Jong (2003). Three species showing this coloration trend have been already discussed above, *Zethera incerta*, *Lohora umbrosa* and *Cirrochroa recondita*. In the following, the respective species will be analysed in more detail by using quantitative methods for describing wing pattern parameters. The creation of new subspecific names is avoided here, but it is attempted to eventually assign the populations of SE Sulawesi to known subspecies. Clear definition of new subspecies would require more material to be analyzed in particular from regions from which material is insufficient or completely lacking such as East Sulawesi.

The genus *Eurema* Hübner, 1819 (Pieridae)

Sulawesi harbours 7 species of the genus *Eurema* of which two, *Eurema irena* Corbet et Pendlebury, 1932 and *Eurema celebensis* Wallace, 1867, are endemic for the Sulawesi Region (Vane-Wright & de Jong 2003) and altogether five of the species occur in SE Sulawesi. Besides predominantly yellow coloured *Eurema* species such as *E. hecabe* Linnaeus, 1758 and *E. blanda* Boisduval, 1836 there are Sulawesian *Eurema* species with extended dark wing coloration which is expressed in males as broadened marginal bands and in females by general reduction of yellow wing areas including suffusion of the yellow patches with brown coloured scales. The species of the latter group include *E. alitha* Felder et Felder, 1862, *E. tominia* Vollenhoven, 1865 and the endemic *E. celebensis* Wallace, 1867. Based on material of these already dark coloured species from SE Sulawesi it appears that this region harbours their most melanotic subspecific forms from the island. As will be outlined below, these *Eurema* species provide impressive examples from the family Pieridae of the overall south-east melanotic trend.

***Eurema alitha* Felder et Felder, 1862**

According to the recent literature, *Eurema alitha* appears to occur on Sulawesi only in the south-west as ssp. *lorquini* Felder et Felder, 1865 and as ssp. *zita* Felder et Felder, 1865 in the northern parts of the island, thus excluding eastern and south-eastern Sulawesi, i.e. the provinces Sulawesi Tengah and Sulawesi Tenggara (Yata & Morishita 1985; Vane-Wright & de Jong 2003). Correspondingly, large areas of the island are left blank on the distribution map of Yata & Morishita (1985). Outside Sulawesi, the species is widely distributed in the Indo-Malayan realm from Sumatra in the West to Papua in the East and has also been recorded from the islands surrounding Sulawesi including those assigned to the Sulawesi region based on zoogeographical considerations (Vane-Wright & de Jong 2003). For example, *E. alitha* is known to occur on Peleng Island in the Banggai Archipelago (Nieuwenhuis 1946; Detani 1983; Yata 1995; Vane-Wright & de Jong 2003) which is separated by the sea from Sulawesi Tengah by less than 20 km. So the species should be expected to occur also on the eastern peninsula. Also, its presence in SE Sulawesi is probable as it was found on the islands Buton, Muna and Kabaena for example (Jurriaanse & Lindemans 1920). Furthermore, Martin (1920) mentions at least 1 female from Kendari at the east coast of Sulawesi Tenggara. Thus, the distributional gap within Sulawesi does not appear plausible. My own investigations revealed records of *E. alitha* from both Sulawesi Tenggara (Plate 88 figs 1-2 & 4-5) and eastern Sulawesi Tengah. Here, I will focus on characterizing the populations of SE Sulawesi.
There is a high variability among specimens of *E. alitha* from SE Sulawesi with respect to wing size and colour pattern. It is attempted here to define several types of variation and to find explanations for their occurrence. Furthermore it will be shown






that in spite of the variability, populations from SE Sulawesi can be clearly distinguished from those of Southwest Sulawesi.

In fact, morphometric analyses of the wing colour pattern of the populations from Sulawesi Tenggara reveal striking differences compared to specimens of the subspecies *lorquini* Felder et Felder, 1865 from Sulawesi Selatan. Quantification of the yellow coloured area on the forewings of male *E. alitha* shows that this area is significantly smaller ($P < 0.0001$, Student t-test) in specimens from Sulawesi Tenggara compared to those from Sulawesi Selatan amounting to 30.9 % and 41.6 % of the total forewing area, respectively (Fig. 1, plate 88 figs 1 & 4). As there are enormous differences in wing span and forewing wing area ranging from 95 mm^2 to 238 mm^2 among individuals (analysed in detail below), the yellow coloured area is given as percentage of the total forewing area. Figure 2 demonstrates that the normalized patch size is independent of wing size.

On the hindwings, the broad dark brown margin was also analyzed quantitatively and compared between *E. alitha* from Sulawesi Tenggara and Sulawesi Selatan. The band width was measured at various positions, i.e. along the wing veins and along the intervenosa starting from vein rr to vein ax1 on the left hindwing resulting in 15 values. To allow comparison between individuals of different wing span, the values were normalized on the distance between hindwing base and the end of vein m1 at the margin. The result in Figure 3 shows that the brown margin is broader over its entire length in specimens from Sulawesi Tenggara (n = 7) compared to those from Sulawesi Selatan (n = 5). All differences are very significant with P-values between < 0.001 and 0.008 according to Student t-test. In the mean, the margin is 1.4 times broader in specimens from Sulawesi Tenggara (Fig. 4). In summary, the quantitative analyses show that the yellow coloured areas on the forewings and the hindwings of male *E. alitha* are much smaller in specimens from Southeast compared to Southwest-Sulawesi. These differences are independent of butterfly size.

Besides the extended dark coloration, there is another phenomenon particularly observed in *Eurema alitha* which will be analyzed here in more detail. This concerns the broad variation in wing span which has been mentioned before already by Martin (1920). Altogether, 31 specimens from Sulawesi Tenggara (Tra) were analyzed showing a range in wing span from 28.8 mm to 46.5 mm. A closer look on the frequency distribution of the data shows that it is trimodal with maxima around 30, 38 and 44 mm (Fig. 5), so that specimens can be assigned to three different size groups which differ significantly from one another as shown by Student's T-test (Fig. 6). For comparison, five specimens each from Sulawesi Selatan (Sel) and from Sulawesi Tengah (Ten) were included in the analysis. The results indicate that discontinuous

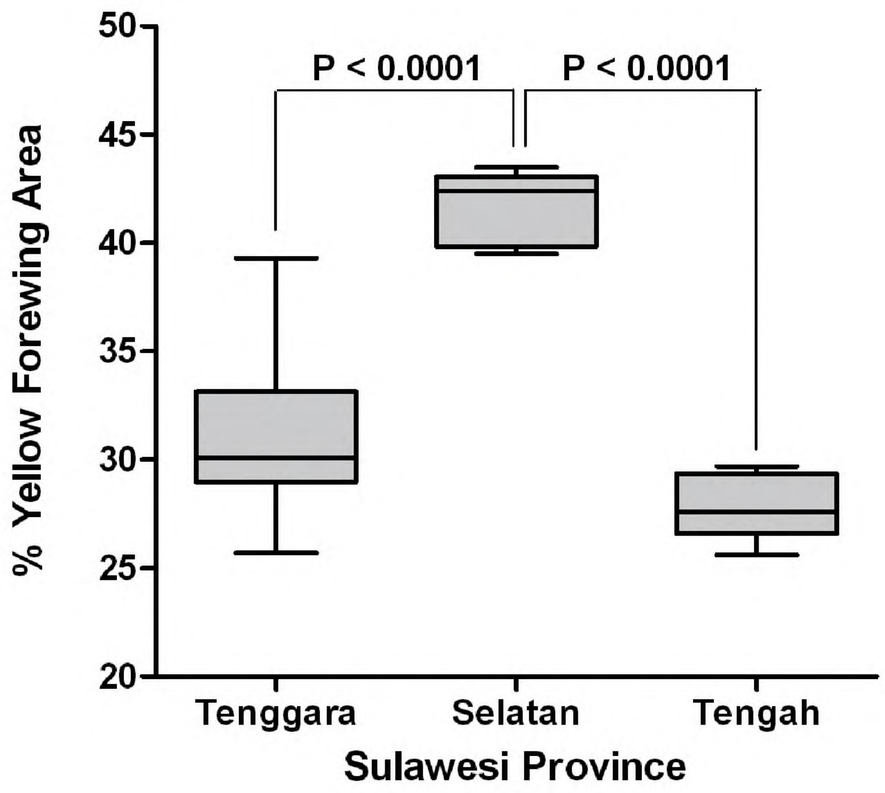


Figure 1. Relative area of the yellow patch on the forewing upperside of *Eurema alitha*. Male specimens from Sulawesi Tenggara (n = 16), S.-Selatan (n = 5) and Sulawesi Tengah (n = 5) were analyzed by FIJI. The patch area was normalized on the total wing area and is given as percentage. Significant differences as indicated (Student's T-test).

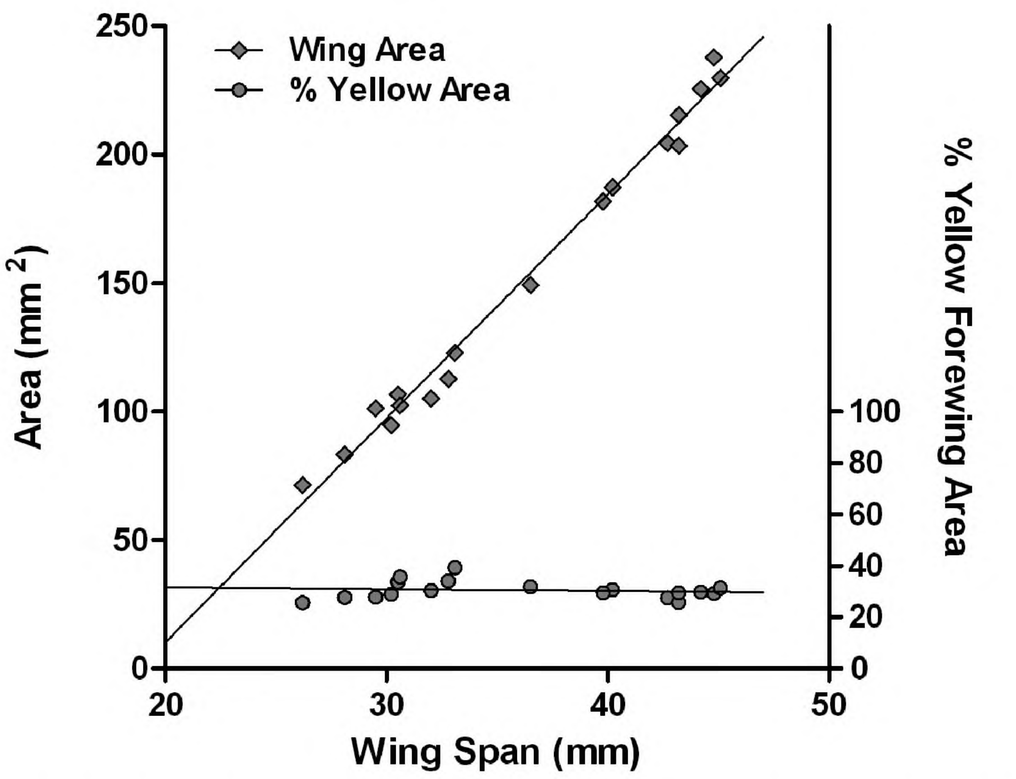


Figure 2. Forewing area and normalized area of the yellow forewing patch of *Eurema alitha* as functions of wing span. For the analysis 18 males were used of which 16 came from Sulawesi-Tenggara. Two further small specimens originate from Koyoan, Luwuk vicinities in Sulawesi Tengah. While there is a linear correlation between wing span and wing area the % yellow area is independent of wing span and thus also of wing area.






size distribution also occurs in *E. alitha* populations of other areas in Sulawesi, at least in Sulawesi Tengah.

The question arises which processes underlie this characteristic frequency pattern in size. Availability or quality of larval food, which may vary seasonally, does not well explain the findings as a more continuous data distribution should be expected. Instead, however, distinct size groups are observed each with its own internal variability. Assuming different numbers of larval stages necessary until final pupation appears to be a plausible hypothesis. The usual number of instars for *Eurema* species is five, as has been shown for *E. laeta* Boisduval, 1836, *E. hecabe* Linnaeus, 1758 and *E. desjardinsii* Boisduval, 1833 (Bogtapa et al. 2015; Clark & Dickson 1965; Sharma 2006). There is only little information on the variability of instar numbers in *Eurema* species. Ooi (1992) observed that dependent on the food plant an additional

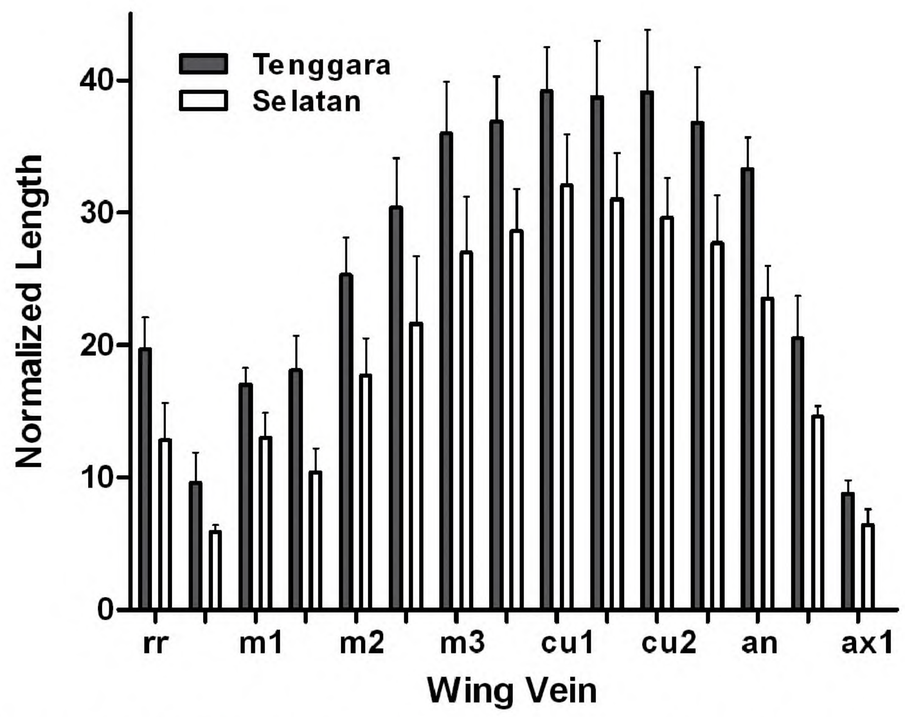


Figure 3. Width of the brown margin of the hindwing upperside in *Eurema alitha* specimens from Sulawesi Tenggara (n = 7) and Sulawesi Selatan (n = 5). Data pairs for the width at the indicated wing vein are followed each by the data of the subsequent intervenosa. To account for butterfly size differences, the values were normalized on the distance between wing basis and end of vein m1. For the significance of differences see text.

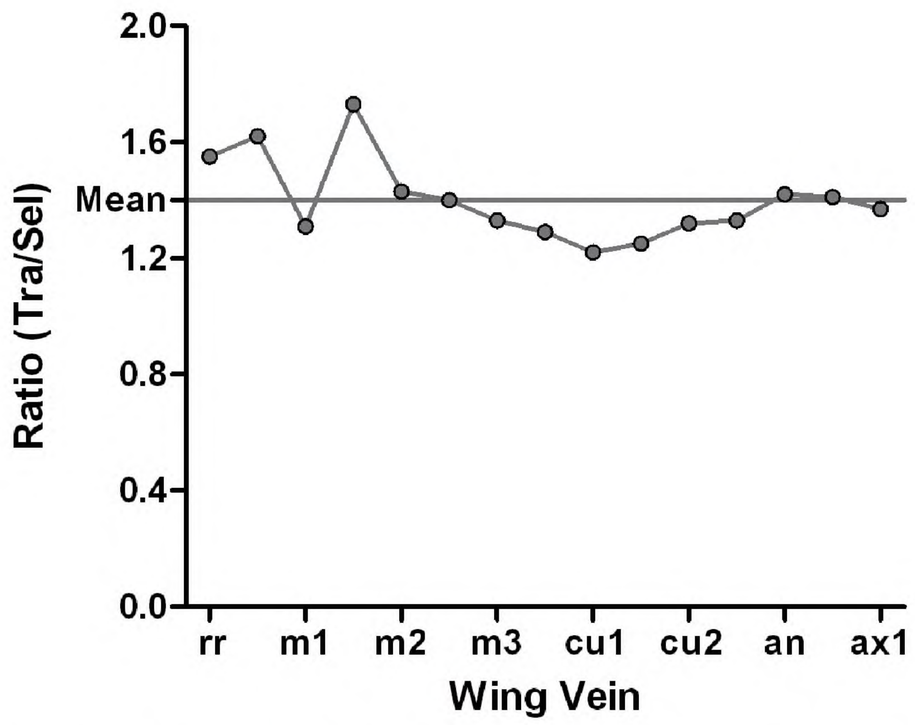


Figure 4. Width of the brown hindwing margin at the different wing veins and the intervenosa of *Eurema alitha* given as the ratio between specimens from Sulawesi Tenggara (Tra, n = 7) and Sulawesi Selatan (Sel, n = 5). Left hindwings were used for the analysis. The mean value of all ratios is 1.40 as indicated by the line).

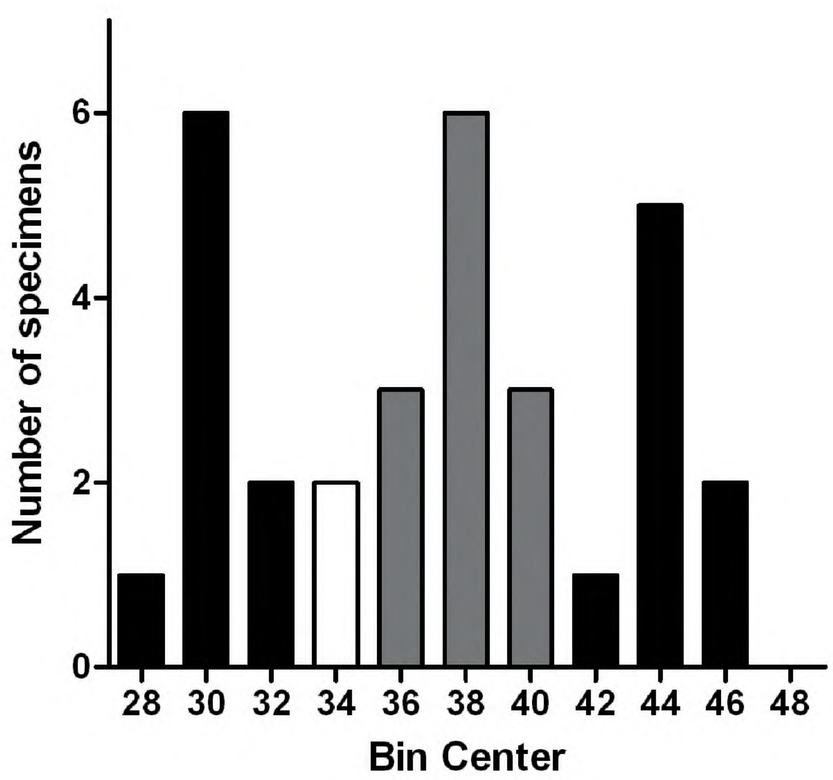


Figure 5. Trimodal size distribution of wing span in *Eurema alitha* from Sulawesi Tenggara. Altogether 31 specimens were used for the analysis. GraphPad Prism was used for calculating the frequency distribution and its presentation vertical scatter plot.

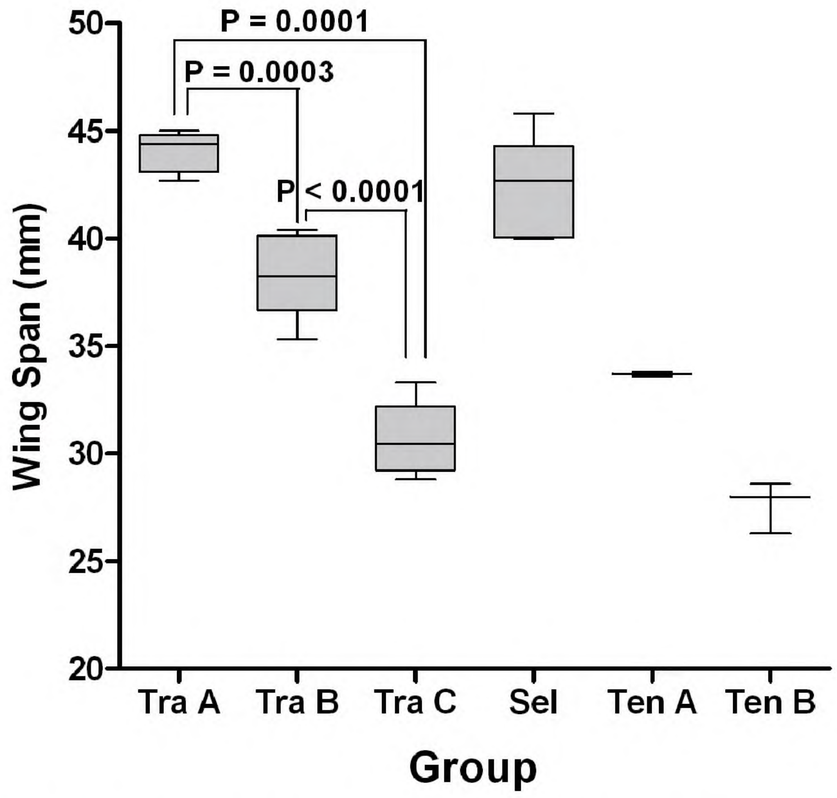


Figure 6. Box plot of wing sizes calculated from specimens of the 3 different size classes of *Eurema alitha* from Sulawesi Tenggara (Tra A, n = 7; Tra B, n = 8; Tra C, n = 10). For comparison, plots are also shown for specimens from Sulawesi Selatan (Sel, n = 5) and from Sulawesi Tengah (Ten A, n = 2; Ten B, n = 3). The differences between the size classes are statistically significant as indicated.





sixth instar can occur in *Eurema hecabe*. However, the length of the larvae and also the head capsule width of the final 5th or 6th instar were identical so that size of the imagines can also be expected to be the same, irrespective of the development via 5 or 6 instars. This latter phenomenon was also recorded for some Satyrinae species (Roos, in preparation). Under the assumption that the middle sized specimens of *E. alitha* develop via 5 instars and the smaller and larger ones by 4 and 6, respectively, the function shown in Figure 7 is obtained by linear regression. It is noted that the line crosses the y-axis close to zero thereby giving a further support for the 'larval instar' hypothesis. For this, quite different underlying regulatory mechanisms must be responsible in contrast to the food plant dependent development of *E. hecabe* described by Ooi (1992).

Differences in wing size and in the extent of dark coloured wing areas of butterflies are often associated with seasonal variation, i.e. dry and wet season forms. This phenomenon has also been shown for *Eurema*-species (Jones 1992; Daniels 1995). The results presented above are obtained exclusively from wet season specimens from both Southwest and SE Sulawesi. Based on only six males from Sulawesi Tenggara taken in the dry season in October, it is shown that there are also season-dependent differences in the wing pattern areas (Fig. 8) while the wing span does not appear to be affected (Fig. 9). Similar to the wet season form, the relative area of the yellow patch is independent of the wing size. The calculated slope for the function % yellow forewing area vs. absolute forewing area statistically does not differ from zero (Fig. 10).

Daniels (1995) compared forewing lengths of dry and wet season forms of 3 different *Eurema* species from Florida, U.S.A. Significant differences were recorded but they were less pronounced than between the season-independent size classes of *E. alitha* described here. Jones (1992) showed that forewing length as well as the colour pattern, i.e. the portion of dark versus yellow areas, seasonally varies among six Australian *Eurema* species. In summary, there appear several mechanisms causing variability in wing size, in colour pattern and in the development of *Eurema* species:

1. *Eurema alitha* from different populations: Region dependent variation in the extent of dark pattern elements. The yellow patch is significantly reduced in specimens from Sulawesi Tenggara compared to those from Sulawesi Selatan (Fig. 1).
2. *Eurema alitha* from Sulawesi Tenggara: Seasonally dependent alteration of the yellow wing area with smaller areas in the wet season form (Fig. 8).
3. *Eurema alitha* from Sulawesi Tenggara: Seasonally independent substantial variability in wing size with a trimodal frequency distribution (Fig. 9) not influencing the extent of colour pattern.
4. *Eurema* sp. from Australia: Seasonally concomitant variation in size and colour pattern (Jones 1992).
5. *Eurema hecabe* Linnaeus, 1758 from Malaysia:

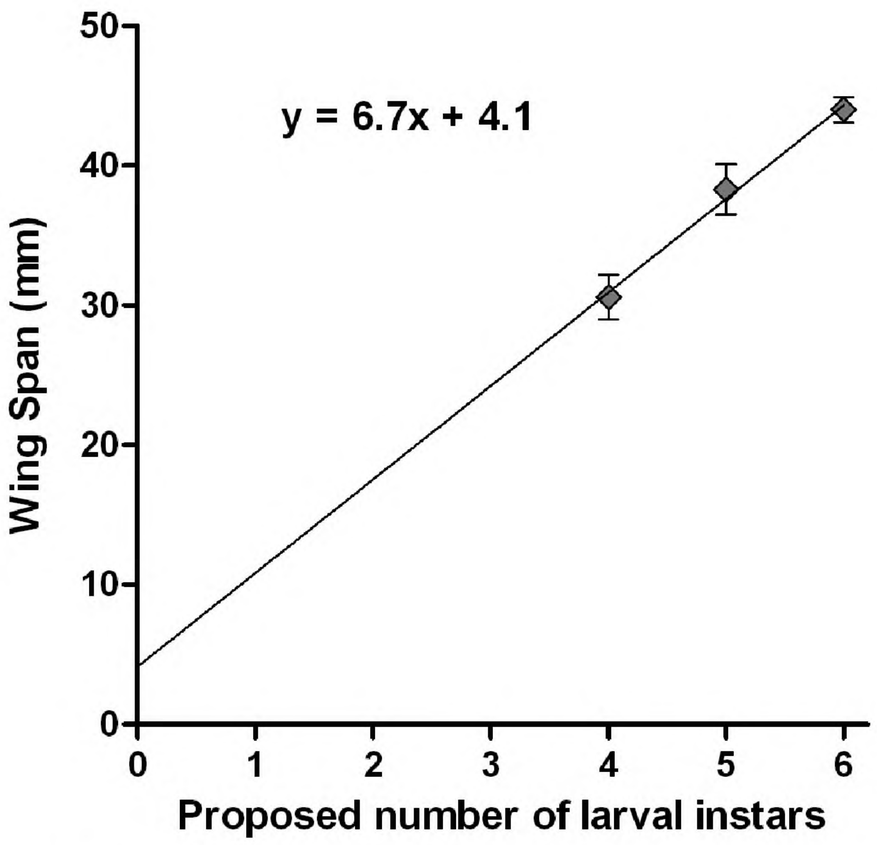


Figure 7. Presentation of the wing span of male *Eurema alitha* butterflies as a hypothetical function of the proposed number of larval instars (see text).

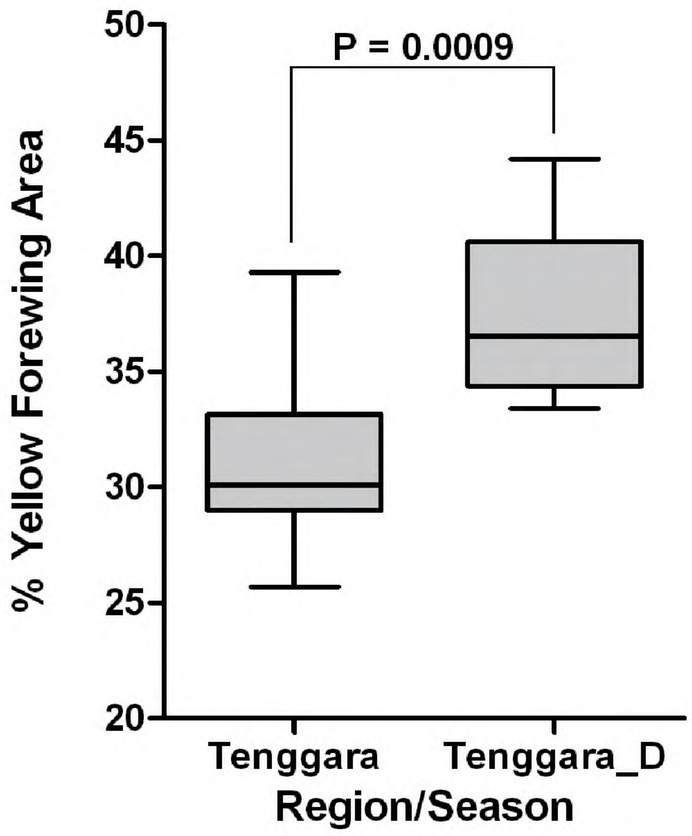


Figure 8. Differences in the size of the yellow forewing area in wet (_W) and dry season (_D) specimens of *Eurema alitha* from Sulawesi Tenggara. The relative size of the yellow patch normalized on the total forewing area is plotted. Number of specimens analyzed: Tenggara_W, n = 16, Tenggara_D, n =6. In spite of the overlap between values of the two samples the difference is statistically significant.





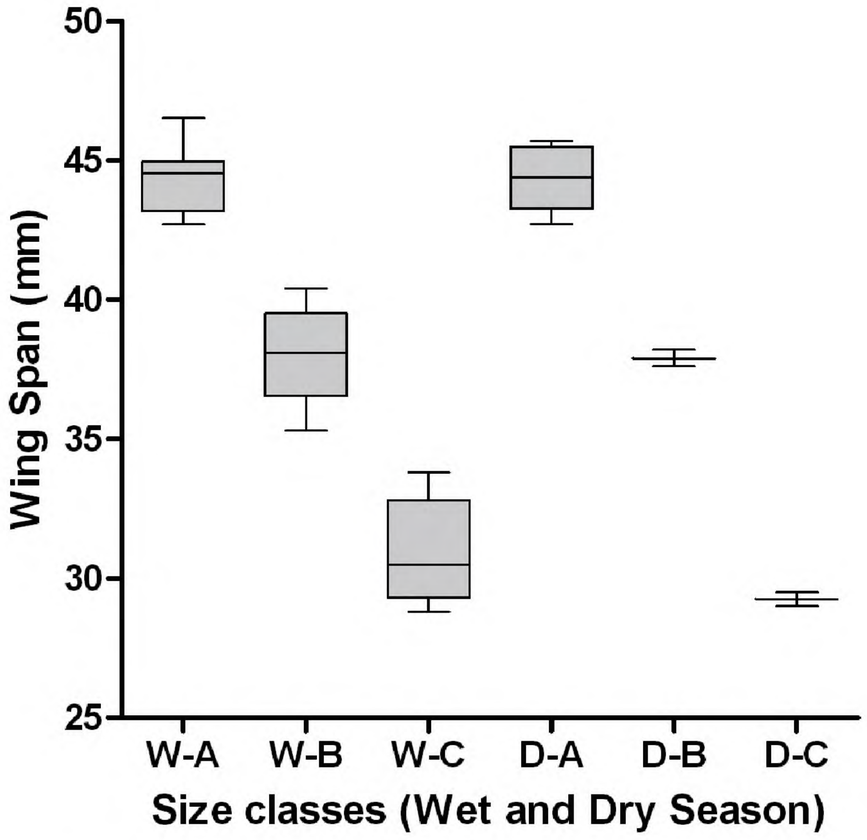



Figure 9. Wing span (mm) of *Eurema alitha* from the wet (W) and dry season (D) in Sulawesi Tenggara. Box-plots for the three identified size classes A – C are shown. Number of analyzed individuals: W-A, n = 8; W-B, n = 12: W-C, n = 11; D-A, n = 5; D-B, n = 2: D-C, n = 2.

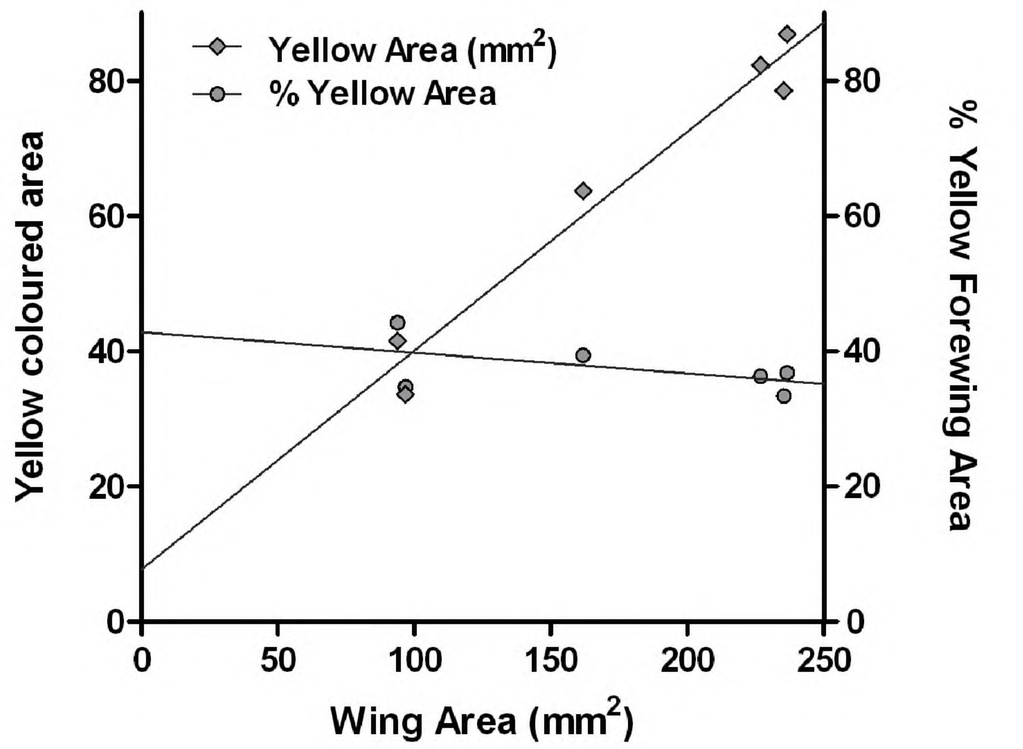


Figure 10. Extent of the yellow coloured forewing area of the dry season form of male *Eurema alitha* from SESulawesi as a function of the total forewing area. For the yellow area absolute values (Raute) and relative values (circles) were used. The latter were calculated by normalization of the absolute values on the total forewing area. While a nearly linear correlation is obtained between the absolute values the normalized patch area is independent of wing size (statistically, the slightly negative slope does not derive from zero).

Food plant dependent development via five or six instar larvae (Ooi 1992).

In females of *E. alitha*, the trend to more melanotic phenotypes in SE Sulawesi is even more pronounced (Plate 88 fig. 2) than in males. However, a quantitative analysis has not yet been performed. Judged from the wing coloration, *E. alitha* from Sulawesi Tenggara resembles much more the northern ssp. *zita* Felder et Felder, 1865 than ssp. *lorquini* Felder et Felder, 1865. Vane-Wright & de Jong (2003) also include populations of Banggai in ssp. *zita* but leave open the subspecific assignment of populations of the islands south of Sulawesi Tenggara. Both, Jurriaanse & Lindemans (1920) and Martin (1920) list the latter under the name *zita*, Martin (1920) even in the rank of a species. In a preliminary study with limited material of *E. alitha* from Muna Island it can be shown here that the colour pattern resembles that of the populations from SE Sulawesi (Fig. 11). In addition, this is also true for populations of Sulawesi Tengah (Fig. 11). A detailed morphometric comparison with ssp. *zita* from North Sulawesi has not yet been performed. Based on figures in Yata (1995), the yellow area on the forewing of a male from Menado [= Manado] in North Sulawesi is of similar size as in specimens from Sulawesi Tenggara, i.e. 32.2% of the forewing area vs. a mean of 30.9%, respectively.

***Eurema tominia* Vollenhoven, 1865**

In addition to the Sulawesi region, *E. tominia* occurs in Borneo. From Sulawesi Island only one subspecies is known, the nominate ssp. *tominia* (Corbet & Pendlebury 1932; Yata & Morishita 1985; Otsuka 1988) while a number of subspecies from adjacent islands are recognized (Vane-Wright & de Jong 2003). The various *E. tominia*-subspecies described from Sulawesi, particularly by Fruhstorfer, such as *toradja* Fruhstorfer, 1910, *zamida* Fruhstorfer, 1908 and *tondana* Felder, 1875 were not mentioned by Martin (1920) except for *battana* Fruhstorfer, 1908, which he considers to be the subspecies from South Sulawesi. Later, all of these subspecies were synonymized by Corbet & Pendlebury (1932) and also not accepted by most subsequent authors (Yata & Morishita 1985; Vane-Wright & de Jong 2003). As an exception, only D'Abrera (1982) lists 3 subspecies from Sulawesi, the nominate subspecies *tominia* for North Sulawesi, ssp. *battana* for South Sulawesi and ssp. *toradja* for East Sulawesi. There are no literature data on the occurrence of *E. tominia* in SE Sulawesi. Also Jurriaanse & Lindemans (1920) do not list *E. tominia* in their publication on butterflies from SE Sulawesi. My own investigations, however, prove its presence from several localities in SE Sulawesi and show that these populations differ by their wing markings from those occuring in other parts of the island. The following locations and data



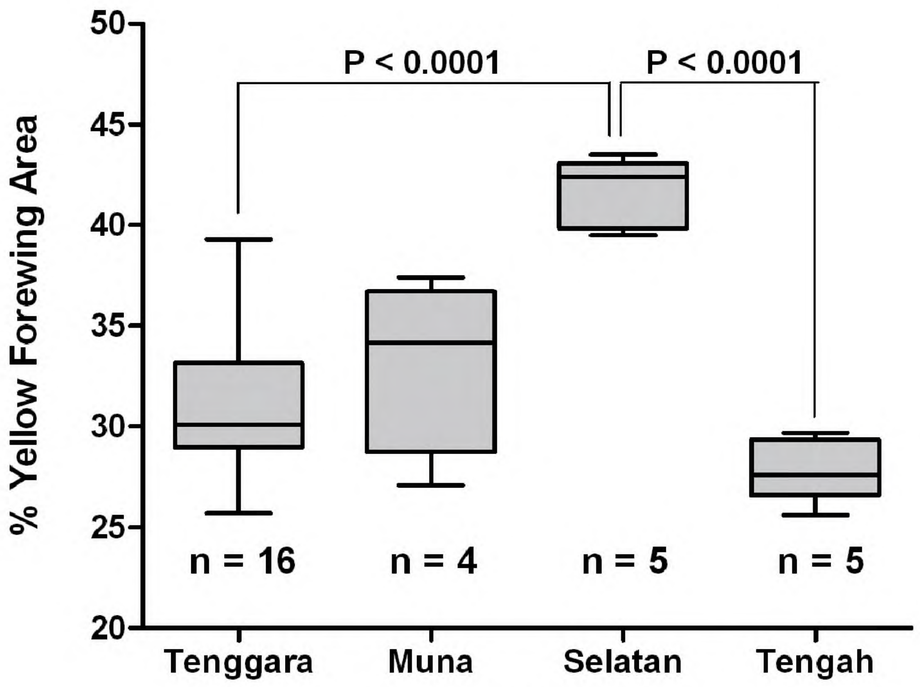


Figure 11. Relative extent of the yellow forewing area between *Eurema alitha* from various regions of Sulawesi (Tenggara, Selatan, Tengah) and Muna Island. Number of analyzed individuals (n) and statistical significance (P) as indicated.

can be listed for *E. tominia*:

Andamao	15.III.2013
Kolaka	22.X.2005, 29/30.III.2009, 01.IV.2009, 17/19/21.III.2011
Porabua	18.III.2013, 16.III.2015
Sambeani	28.II.1999, 02.III.1999

As in *E. alitha*, the south-eastern *E. tominia*-subspecies is characterized by reduced yellow-coloured areas on the wings' upperside compared to nominotypical *E. tominia* from Sulawesi Selatan (Fig. 12, plate 88 figs 7-10). In the mean (M), the portion of the yellow area on the forewing uppersides amounts to 36.8% compared to 20.7% in specimens from Sulawesi Selatan and Sulawesi Tenggara, respectively. Figure 12 shows the data for individual specimens (numbers) and the corresponding mean values including standard deviations (M). There is only little variation in the normalized values for the size of the yellow patch although there are substantial differences in the total forewing area in *E. tominia* individuals from SE Sulawesi. Due to insufficient material it cannot be concluded whether there are discrete size classes in *E. tominia* similar to *E. alitha.*

Female specimens from SE Sulawesi have nearly completely dark brown forewings, i.e. the yellow pattern elements are completely or largely missing (Plate 88 figs 3 & 6). In this respect they resemble *E. celebensis* ssp. *exophthalma* Fruhstorfer (see below) from Sula Island and represent the darkest form of mainlaind Sulawesi. Further material of female *E. tominia* is needed for a more comprehensive analysis.

Eurema celebensis Wallace, 1867

Typical *E. celebensis* was described from Makassar in Southwest Sulawesi (Wallace 1867). A further subspecies, ssp. *exophthalma* Fruhstorfer, 1910, which is characterized in males by broad dark forewing margins and in females by nearly completely dark brown coloured wings, occurs on the Sula Islands and in the Banggai Archipelago, located in the East of the Sulawesi region. Corbet & Pendlebury (1932) state that "As a rule specimens from South Celebes are slightly larger and more yellow than those from North Celebes". This is not true, however, for the populations from SE Sulawesi which may be assigned to ssp. *exophthalma*. Females from Sambeani and Porabua (Sulawesi Tenggara) are completely or nearly devoid of yellow markings on their forewings and males from that region show broader brown forewing margins compared to specimens from the southwest (Plate 89 figs 1-11). So, we can extend the distribution area of ssp. *exophthalma* from the Sula- and Banggai-Islands (Detani 1983; Yata 1991) to SE Sulawesi. Accordingly, the distribution map in Yata & Morishita (1985) has to be revised. There is little information on *E. celebensis* and the occurring subspecies from Central and East Sulawesi. It is noted that a female *E. celebensis* taken near Koyoan in Sulawesi Tengah shows nearly complete dark brown forewings (Air Terjun Dendengan, Koyoan, west of Luwuk, Sulawesi Tengah, March 2015, P. Roos) (Plate 89 fig. 12). It is assumed that the area of ssp. *exophthalma* also includes East Sulawesi.

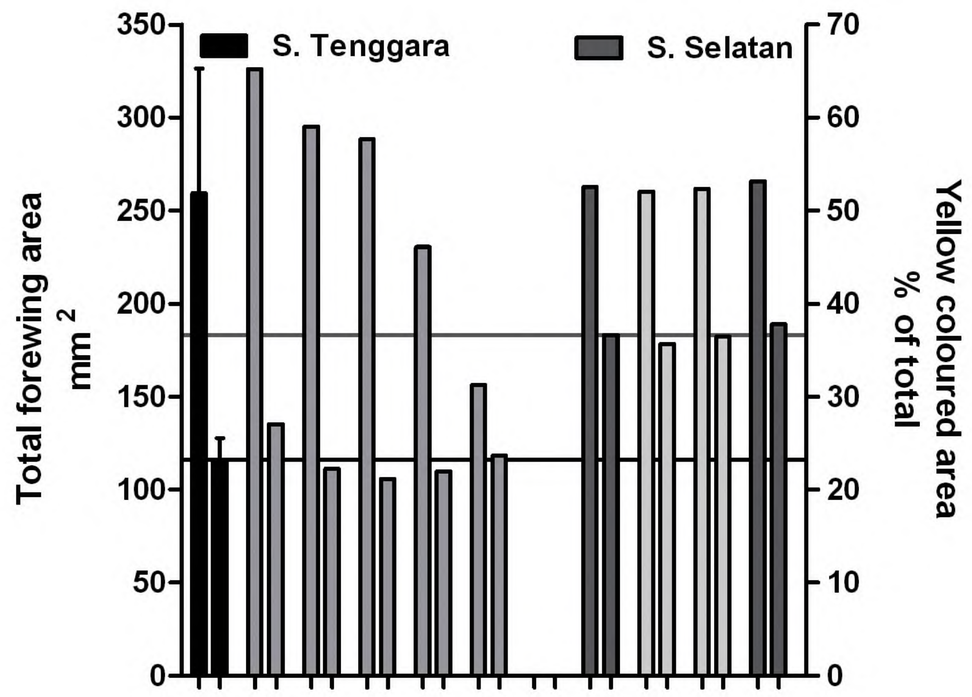


Figure 12. Total forewing area and relative extent of the yellow coloured forewing area of *E. tominia* from Sulawesi Tenggara and Sulawesi Selatan. Left and right bar of each pair represent the total forewing area and the yellow coloured area in % (right ordinate), respectively. Mean values (M) and data for individual specimens (n = 5 and n = 3) are shown. The means of the yellow patch sizes of the two different populations are each indicated by a line.






As stated by several authors (Martin 1920; Yata & Morishita 1985; Yata 1991) and based on own observations *E. celebensis* is rather rare and does not form dense populations as is known for other *Eurema* species (Roos 2000).

Three males of *E. celebensis* from each of Sulawesi Tenggara and Sulawesi Selatan, which are shown in figs 1-3, 7-9 on plate 89, were used for a quantitative analysis of the yellow forewing area. For this the total area and the yellow coloured area of both forewings were quantified by means of the FIJI software and the mean values calculated. Then the percentage of the yellow area related to the total wing area was determined. Finally, means and standard deviations were calculated including the three specimens of each subspecies. Furthermore, the wing span of each specimen was determined. The data are summarized in the Table 1:

Table 1. Forewing area, wing span and relative extent of the yellow coloured forewing patch of male *E. tominia* Vollenhoven, 1865 from Sulawesi Tenggara and Sulawesi Selatan.

Legends: Wing span is also given for females; s – significant; ns – not significant; number of specimens analyzed in each group as indicated.

	Sulawesi Tenggara (n = 3)	**Sulawesi Selatan** (n = 3)	**Significance** Student's T-test
% yellow area	36,5 ± 4,1	48,6 ± 2,3	P = 0.011 s
wing area (mm^2)	105,4 ± 21,5	141,3 ± 19,8	P = 0.100 ns
wing span (mm)			
males	31,1 ± 3,7	36,0 ± 2,8	P = 0.141 ns
females	36,0 ± 1,0	37,8 ± 1,4	P = 0.144 ns

The quantitative analyses reveal a clear and significant (P = 0.011) difference in wing coloration between the two subspecies. The differences in wing span and wing area are not significant. More material is needed for the analyses to prove the obvious differences in wing size which are absolute values in contrast to the quantified yellow patch which is normalized on the wing area. As has been shown above for *E. alitha* different size classes also do exist in *E. celebensis* affecting the statistical analysis in particular of small samples, n = 3 in this case.

Ceporia eperia Boisduval, 1836 (Pieridae)

Martin (1920) states that *C. eperia* is abundant on Sulawesi at higher elevations and rare in coastal areas. Also, Yata & Morishita (1985) give entire Sulawesi as the distribution area for the species, although there are no literature records which document its occurrence in East and SE Sulawesi. Accordingly, Iwasaki & Yata (2005) give North and South Sulawesi as area for *C. eperia* and selectively exclude Central, East and SE Sulawesi. Additionally, the authors list *C. eperia* for the island Buton which is located to the south of SE Sulawesi and describe the ssp. *flava* Iwasaki et Yata, 2005 from there. This subspecies is characterized by the extension of the black forewing markings compared to the nominotypical form.

I have found *C. eperia* also on mainland SE Sulawesi. These specimens show broader black wing markings and are therefore tentatively assigned here to ssp. *flava*. A specimen from SE Sulawesi is shown on plate 88 figs 11-12. I can give the following locations and dates for *C. eperia* in Southest Sulawesi: Kolaka (March 1994), Porabua (March 2009) and Konawendepiha (March 2011). Based on my observations, the species is much rarer in this region than *Ceporia timnatha* Hewitson, 1862.

The genus *Cyrestis* Boisduval, 1832 (Nymphalidae: Biblidinae)

According to the current state of knowledge, the genus *Cyrestis* comprises altogether 4 species on Sulawesi Island and a fifth one *C. eximia* Oberthür, 1879 occurs on Sangihe within the Sulawesi Region. Up to now, 3 *Cyrestis* species are known from Sulawesi Tenggara: *C. strigata* Felder et Felder, 1867, *C. paulinus* Felder et Felder, 1860 and *C. thyonneus* Cramer, 1779 while *C. heracles* Staudinger, 1896 is missing. According to Vane-Wright & de Jong (2003), the latter species is restricted to North and Central Sulawesi but Tsukada et al. (1985) marks only the northern peninsula on the distribution map. My own observations, however, have proven the presence of *C. heracles* in the eastern parts of Sulawesi Tengah (Koyoan, vic. Luwuk, Sulawesi Tengah, 07.iii.2015). Jurriaanse & Lindemans (1920) also do not mention *C. heracles* from the Islands Buton and Kabaena. The absence of *C. heracles* from SE Sulawesi and its






presence in East Sulawesi is of zoogeographical interest as there are otherwise many similarities and congruencies between the two areas with respect to the distribution of butterfly species and subspecies. In this case, the non-existence of the species *C. heracles* in the Southeast is a peculiarity (see section below). Corbet and Pendlebury (1992) and Holloway (1973) claim the presence of *Cyrestis cocles* Fabricius, 1787 on Sulawesi; this cannot currently be substantiated.

***Cyrestis strigata* Felder et Felder, 1867**

According to my own observations, *C. strigata* is the most common among the four *Cyrestis* species occurring on Sulawesi and appears to occur all over the island (Martin 1924). However, Jurriaanse & Lindemans (1920) do not mention the species from Sulawesi Tenggara but from the off-shore islands Wowoni and Buton located on the east and south coast of that province. Also, Martin (1903), Martin (1924) and Tsukada et al. (1985) do not list any locality for *C. strigata* in SE as well as in East Sulawesi. My own surveys have shown its presence in Sulawesi Tenggara from the following places: Kolaka, Sambeani, Lasada, Asolu, Porabua and Andamao – all located north of the line between Kolaka and Kendari from the west and east coast. The upperside wing pattern of *C. strigata* is variable, particularly concerning the extension of the white median band. This pattern element has been analyzed quantitatively in two different ways:

1. The width of the band in the forewing cells has been quantified individually and related to the forewing length to account for size differences as mentioned before;
2. The area of the band on the forewings has been determined and then related to the total wing area as percentage. The populations from SE Sulawesi statistically differ in the extension of the median band from those occurring in the northern parts of South Sulawesi, i.e. from Sumarorong and Rantepao. The white band is clearly broader in the latter (Figs 13-14; plate 89 figs 13-18).

By both methods mentioned above, concerning total band area as well as the band width in all forewing cells, the differences between specimens from Sulawesi Tenggara and Sulawesi Selatan are statistically significant.

A comparison between specimens from further parts of Sulawesi, revealed that the band extension for the populations from SE Sulawesi is nearly identical to those from East Sulawesi and is similar, but significantly broader (P = 0.026) in specimens from southern South Sulawesi (Bantimurung) (Fig.

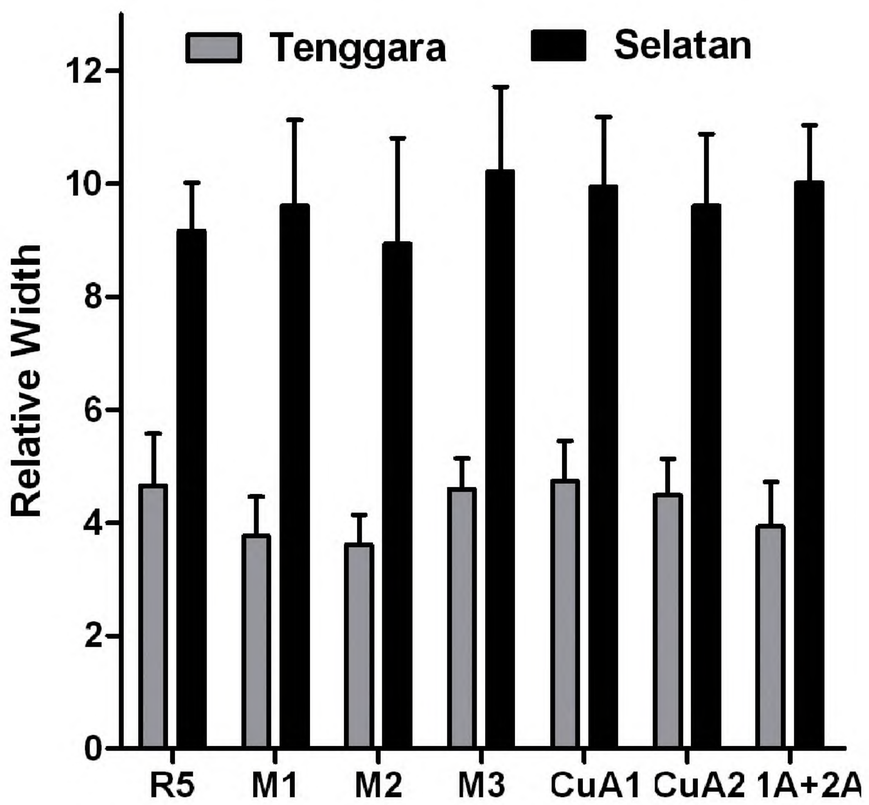


Figure 13. Relative width of the white median band in the different wing cells on the forewing upperside of *Cyrestis strigata* from Sulawesi Tenggara and Sulawesi Selatan. The relative band width is given as percentage of the forewing lengths. Measurements were each executed for both forewings and then means of the two values were calculated. These were used for calculating means and standard deviations obtained from 4 specimens of Sulawesi Tenggara (Kolaka) and 3 specimens from Sulawesi Selatan (Rantepao, Sumarorong).

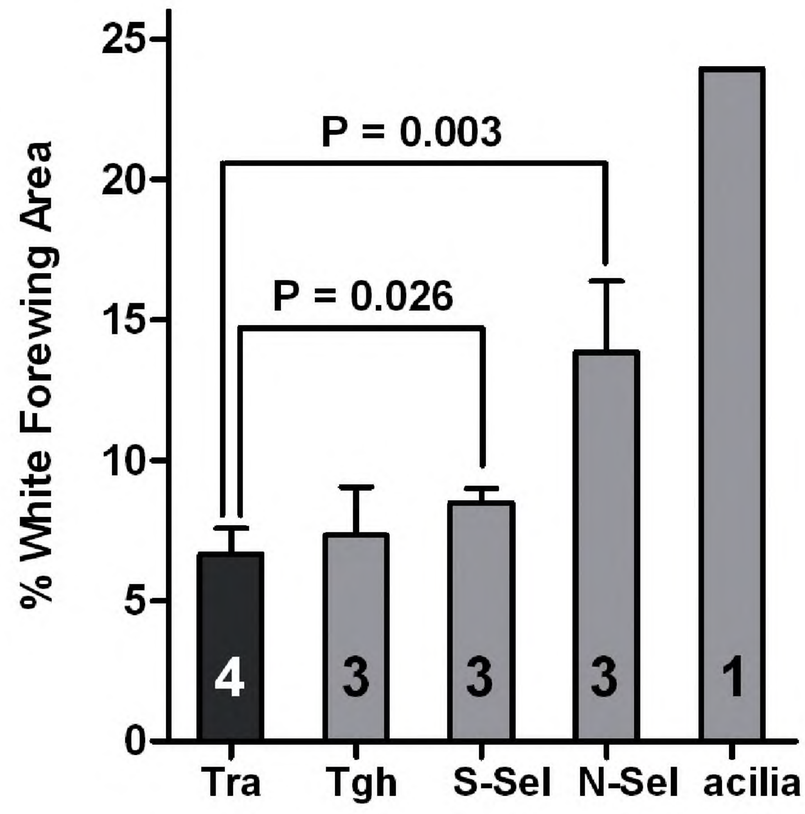


Figure 14. Area of the white median band on the forewings of *Cyrestis strigata*. The band area was determined on both forewings by means of the FIJI software and normalized of the total wing area. The means were used for further calculations concerning the different samples from Sulawesi Tenggara (Tra), Sulawesi Tengah (Tgh), southern (S-Sel) and northern Sulawesi Selatan (N-Sel). For comparison a representative specimen of *Cyrestis acilia* from Timika (Papua, Indonesia) was analyzed. The number of analyzed specimens is shown on the bars. Statistically significant differences as indicated.

14). Thus, the darkest forms of *C. strigata* occur in SE Sulawesi, similar to those from East Sulawesi.

Cyrestis paulinus Felder et Felder, 1860

The species of the *Cyrestis* subgenus *Apsithra* Moore, 1899 (= *cocles* group) of the Sulawesi region are under current revision (Roos, in preparation). There are no published records of *C. paulinus* from SE Sulawesi although the distribution map of Tsukada et al. (1985) depicts the entire eastern parts of Sulawesi from the south to the north as distribution area for *C. paulinus mantilis* Staudinger, 1886. My own investigations have shown, however, that SE Sulawesi is not inhabited by ssp. *mantilis* but by ssp. *kransi* Jurriaanse et Lindemans, 1920, which has been described from the island Wowoni and is also known from Buton. The following locations and data can be given for *C. paulinus kransi* in SE Sulawesi: Porabua in March 2009, 2011 and 2013; Konawendepiha in March 2013; Uete in March 2011. The occurrence of ssp. *kransi* both in SE Sulawesi and its southern offshore islands underlines once more the faunistic relationship between theses regions. To the contrary, the islands Peleng and Mangole (Sula Islands) off East Sulawesi bear the ssp. *kuehni* Röber, 1886 and ssp. *seneca* Wallace, 1869, respectively, while ssp. *mantilis* occurs on mainland East Sulawesi. It is not known whether there are contact zones or overlapping areas for *mantilis* and *kransi* in the northern parts of Sulawesi Tenggara. Furthermore, it is questionable whether the four different subspecies, i.e. *mantilis*, *kuehni*, *kransi* and *seneca* belong to one and the same species, *C. paulinus*. The different subspecies occurring in the Sulawesi region and further two, ssp. *gilolensis* Lathy, 1904 from Seram and ssp. *waigeuensis* Fruhstorfer, 1900 from Waigeo of the Papuan region are shown on plate 90 figs 1-16) for comparison.

Clearly, the south-eastern ssp. *kransi* constitutes the *paulinus*-subspecies in which the dark wing pattern elements are most strongly broadened, although the intensity of the brown colour may be stronger in other subspecies. As the whole group is under revision detailed analyses are not presented here but the Figures on Plate 90 undoubtedly demonstrate the large differences in wing colour intensity and also patterns between the relevant subspecies. Considerable variation in wing colouration is observed in *C. paulinus kransi* reminiscent somewhat of the dry and wet season form of *Cyrestis cocles* Fabricius, 1787. However, both brighter or darker specimens of ssp. *kransi* have been taken at the same time at the same location.

Lexias aeetes Hewitson, 1861

L. aeetes is an endemic species of the Sulawesi region. As well as on the main island, the species also occurs on adjacent islands such as Peleng, Buton and Wowoni from which subspecies have been described. The most obvious variation in the wing colour pattern concerns the hindwing upperside which largely lacks any light markings in the subspecies of the offshore islands and shows clear markings of varying extension in the subspecies described from Sulawesi proper. According to the current literature, the nominate subspecies occurs in North Sulawesi, ssp. *satellita* Jurriaanse et Lindemans, 1920 in Central Sulawesi and ssp. *phasiana* in South Sulawesi (Tsukada 1991; Vane-Wright & de Jong 2003). Although data are obviously missing, Tsukada (1991) includes SE Sulawesi in the range of ssp. *satellita*, while Vane-Wright & de Jong (2003) do not mention any subspecies from that part of the island. This is the state of prior knowledge. Analysis of specimens from SE Sulawesi and evaluation of literature data reveals that this current picture needs to be corrected.

Wing pattern analyses of specimens from different localities in SE Sulawesi, i.e. Moramo, Sambeani, Asinua and Porabua, show that these populations coincide with ssp. *butongensis* Tsukada, 1991, which has been described from Buton Island which is located to the South of Sulawesi Tenggara. This subspecies is characterized by the hindwing upperside which is nearly devoid of any colour pattern as in ssp. *rubellio* Fruhstorfer, 1898 from Peleng Island located in the Banggai Archipelago of East Sulawesi.

Thus, *Lexias aeetes* is an example of a species from the family Nymphalidae which tends to have darker wings in the southeast compared to other regions in Sulawesi. Reduction of light markings on the hindwing, which is obvious from figs 1-4 (Plate 91), is also true for the forewings as substantiated by a detailed quantitative analysis of the colour pattern. This is exemplified by quantifying the area of four selected white patches on the forewing upperside. The white areas marked with a and b were determined in cells R5, M1, M2 and M3 of the left forewing of four specimens each from SE and Southwest Sulawesi (Fig. 15). For comparability, the areas of the patches were normalized on the total forewing area and given as percentage. It is noted that wing size and wing geometry do not differ between the populations (Table 2, next page).





Table 2. Wing size and wing geometry of *Lexias aeetes* from Sulawesi Tenggara and Sulawesi Selatan.

Legends: The left forewings of four specimens each were analyzed. The parameters were quantified by means of photographs and the programm FIJI.

	Sulawesi Tenggara		**Sulawesi Selatan**	
Parameter	Mean	S.D.	Mean	S.D.
Wingspan (mm)	66.73	2.41	67.61	1.86
Forewing, length (mm)	38.77	0.83	38.82	0.97
Forewing, hindmargin (mm)	28,87	1.06	28.73	0.61
Forewing, height (mm)	24.03	0.67	25.01	0.78
- Length/Height (ratio)	1.61	0.06	1.55	0.05
Forewing, area (mm^2)	637	8	645	22

All five quantified patches appear generally smaller in specimens from SE Sulawesi compared to those from Southwest-Sulawesi although the differences are only significant for the pattern elements M2a, M3a and M3b (Fig. 16; Plate 91 figs 1-2). The P-values obtained by Student's t-test are 0.029, 0.024 and 0.046, respectively. The total area of all measured patches is also significantly different between specimens from the two regions with P = 0.025. Means and standard deviations are (% sum of all patches area of total forewing area): 4.32 ± 0.80 and 5.62 ± 0.37 for specimens from SE- and Southwest Sulawesi, respectively.

The *L. aeetes* populations from SE Sulawesi can be assigned to the subspecies currently known as ssp. *butongensis* Tsukada, 1991 from Buton Island. However, this taxon is synonymous with *satellita* Jurriaanse et Lindemans, 1920, as will be outlined here. The latter subspecies has been described from Wowoni, a small island off the east coast of SE Sulawesi. Based on the original *satellita* description, the wing pattern clearly meets that of ssp. *butongensis* of Tsukada. A male of *satellita* from Palu figured by Tsukada (1991) does not match the characteristics of that subspecies but nearly coincides with ssp. *phasiana* Butler, 1870 from Southwest Sulawesi. This is also true for a male from Puncak Palopo figured by Casteleyn (2004) under the name *satellita*. According to the distribution map given by Tsukada (1991), ssp. *satellita* is said to occur in SE, East, Central and the northern parts of Southwest Sulawesi, up to the Palu Valley in the north, omitting, however, the type-locality Wowoni Island. The latter island is located just north of Buton. The current nomenclatorial and distribution status can be summarized as follows:

***Lexias aeetes* Hewitson, 1861 *satellita* Jurriaanse et Lindemans, 1920**

= ssp. *butongensis* Tsukada, 1991 **syn. nov.**

The distribution area of subspecies *satellita* covers the islands Buton, Kabaena and Wowoni and SE Sulawesi (Tsukada 1991; Jurriaanse & Lindemans 1920; Roos, this paper). The northern distribution limits of *satellita* are not known and it is also not clear whether or how far it penetrates into the eastern peninsula of Sulawesi, there eventually meeting ssp. *rubellio* Fruhstorfer, 1898 which also has largely reduced hindwing markings. The following locations and data for *L. aeetes* in SE Sulawesi can be given: Sambeani, 27.II.1999, Asinua, 14.X.2002, Porabua, 19.X.2005 / 18.III.2013, Silui, 14.III.2013 / 16.III.2015; Moramo, 03.IV.2009; Kendari, 26.III.2015.

***Neptis ida* Moore, 1858**

There is substantial wing pattern variability in *Neptis ida* within the Sulawesi region. As already stated by Vane-Wright & de Jong (2003), there is confusion about the subspecific taxonomy of the species and in the assignment of populations from different areas to described subspecies. According to Tsukada et al. (1985) *Neptis ida* is represented on both southern peninsulae of Sulawesi by the ssp. *sphaerica* Fruhstorfer, 1907. However, my own material shows that the populations of Southwest and SE Sulawesi clearly differ in their wing markings (Plate 91 figs 5-10). Additionally, *sphaerica* is introduced by Fruhstorfer (1907) as an infra-subspecific taxon and is thus not available as valid name (Eliot 1969).

The populations of *N. ida* from SE Sulawesi are characterized by darkened wing markings and thus follow the proposed darkening trend. To objectify this observation, wing pattern elements of the forewing upperside were analyzed in a verifiable way which can be applied for future comparative studies of further populations. The mean colour intensity was determined in equally sized rectangles placed within the white/grey pattern elements of





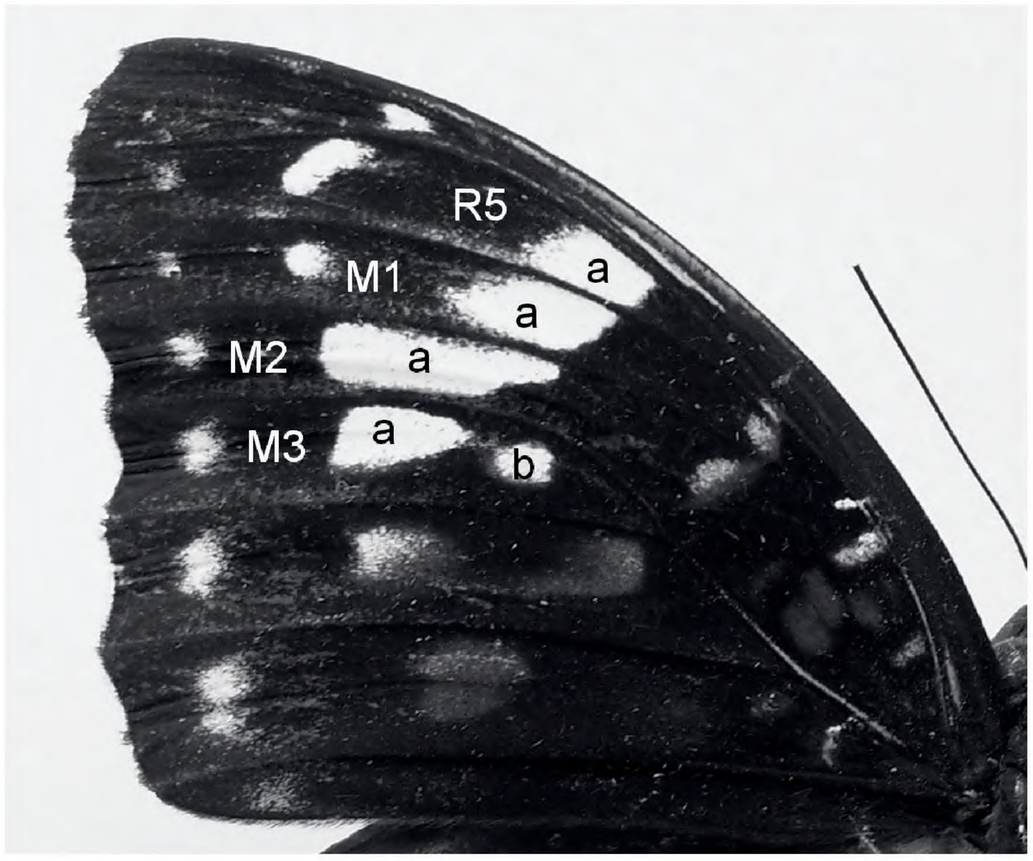



Figure 15. Quantification of wing pattern elements of *Lexias aeetes* Hewitson, 1861. Left: Forewing showing the areas used for quantitative analysis.

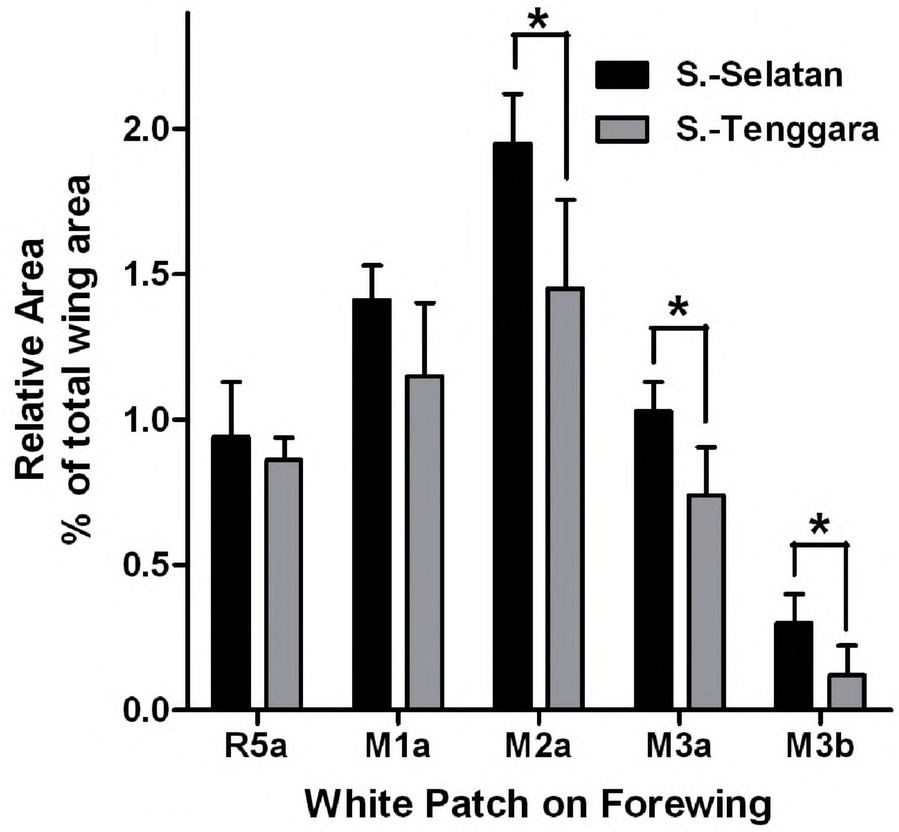


Figure 16. Bar-diagram showing the relative areas of the white patches (see Fig. 15) as a percentage of the total wing area for *Lexias aeetes* specimens from Sulawesi Selatan (n = 4) and Sulawesi Tenggara (n = 4). The areas were quantified on the left forewing of each specimen, using the FIJI software. The analyzed specimens originate from the following locations: Bantimurung (Sulawesi Selatan), Moramo, Porabua, Sambeani, Asenua (Sulawesi Tenggara). Significantly different values are marked with an asterisk (see text).

the forewing (F1, F2) and hindwing (H1 to H5) (Fig. 17). The patch in hindwing cell M2 is divided into two areas displaying different intensities marked with H3a and H3b. For comparison a specimen of *N. ida* from Sulawesi Selatan is shown in Figure 18. The intensity was also determined for a dark coloured area in forewing cell Cu1 as control.

A comparison of the patch intensities between *N. ida* specimens from Sulawesi Selatan and S. Tenggara shows that on the forewing all the patches are generally darker in the former. On the hindwing the darkening concerns the patches in wing cells R and M1 but not in cells Cu1 and Cu2. As already mentioned above, the cell in M2 is heterogenous. The results of the intensity measurements for specimens from the two Sulawesi provinces are shown in Figure 19. For this exploratory analysis only one specimen each was used and parameters were determined for both forewings. Finally, means were calculated and presented in a bar diagram. There are clear-cut intensity differences for the parameters F1, F2, H1, H2 and H3a while intensities are similar for H3b, H4 and H5 which may serve as a good control for the measurements. Out of the complete set of parameters three were selected for further studies with extended sample sizes. Intensities for F2, H2 and H4 (constant) were determined on both left and right wings for 9 specimens each from Sulawesi Tenggara and Sulawesi Selatan (Fig. 20). Characters F2 and H2 differ significantly between specimens from the two provinces with $P < 0.001$ in contrast to H4 ($P = 0.156$, not significant). By the described quantitative method, the darkening trend in *N. ida* from SE Sulawesi can be clearly demonstrated. Besides the decrease in intensity, the white/grey patches in southeastern *N. ida* are also smaller than in specimens from Sulawesi Selatan (results not shown) thus additionally aggravating the darkening effect.

The current investigations shed some light on the confusing treatment of the infraspecific taxonomy of *N. ida*. However, populations from more subregions in Sulawesi have to be analyzed quantitatively to come to a final sound conclusion. Based on the above data the populations of SE Sulawesi are tentatively assigned to ssp. *carbonespersa* Martin, 1924.

There are more butterfly species or subspecies in SE Sulawesi showing the wing pattern darkening trend but they have not all been analyzed in detail. For a final proof relevant pattern elements have to be identified for each species and methods for their quantitative analyses have to be defined. For example, *Cepora timnatha* Hewitson, 1862 (Pieridae) and *Polyura cognata* Vollenhoven, 1861 (Nymphalidae) are prospective candidates.

Sulawesian butterfly species missing from Sulawesi Tenggara

In this last section, selected butterfly species will be listed which have not yet been reported from





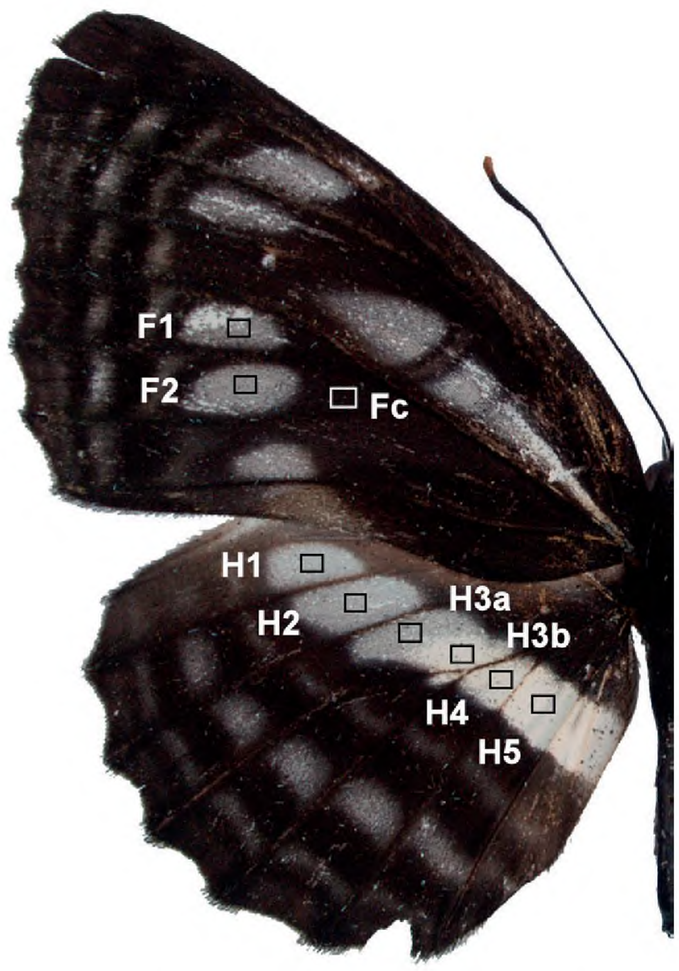


Figure 17. Areas on the wings of *Neptis ida* Moore, 1858 which were used for intensity measurements using FIJI-software. Specimen from Sulawesi Tenggara showing the transition in intensity of the hindwing median band from H3a to H3b in wing cell M2.



Figure 18. Specimen of *Neptis ida* from Sulawesi-Selatan for comparison showing the uniformity in the intensity of the white median band on the hindwing which is different in specimens from Sulawesi Tenggara (Fig. 17).

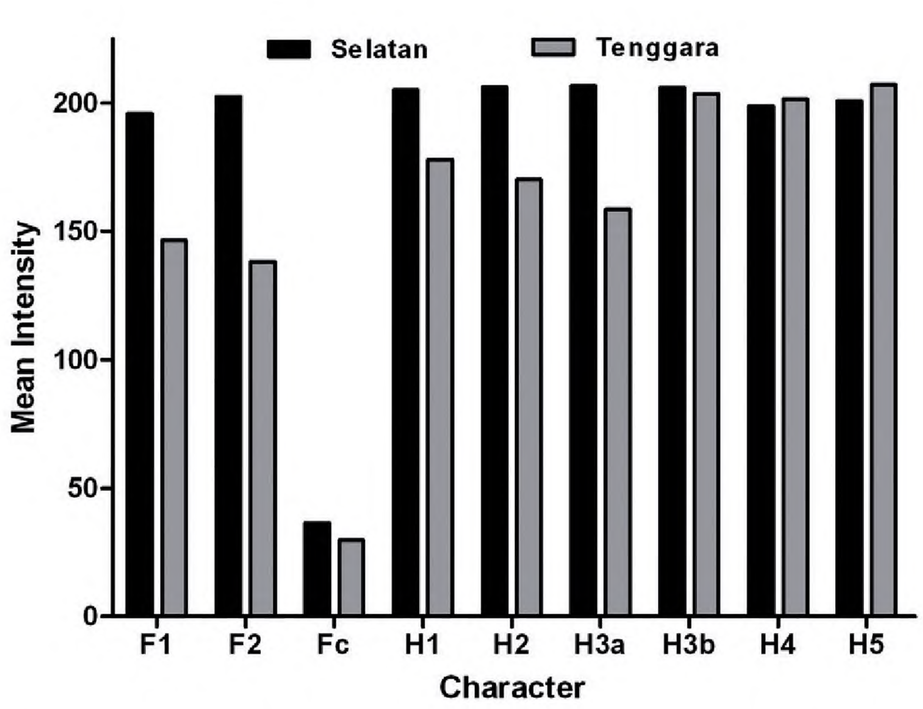


Figure 19. Comparative quantitative analysis of the wing pattern of *Neptis ida* from Sulawesi Tenggara and Sulawesi Selatan. The intensities of the median band in the different wing cells were quantified in equally sized rectangles by FIJI. Only one representative specimen from each region was analyzed. Values are means of the measurements on the left and the right wings.

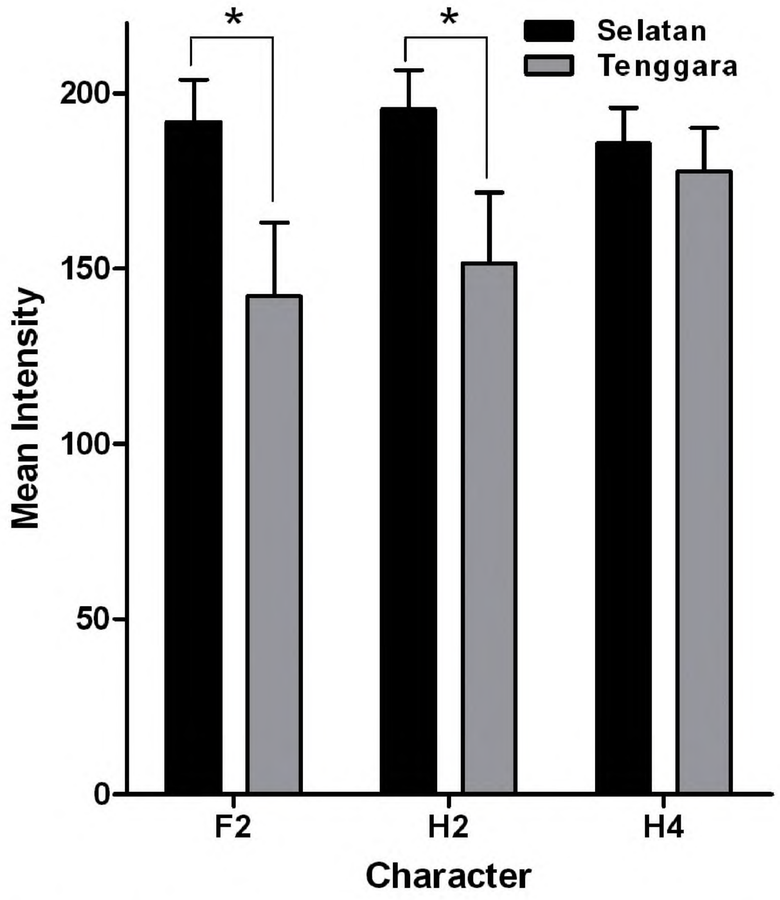


Figure 20. Intensities of the median band for characters F2, H2 and H4 (see fig 17) of *Neptis ida* from Sulawesi Tenggara and Sulawesi Selatan. From each region, 9 specimens were analyzed. Statistically significant differences are marked with an asterisk ($P < 0.001$).

SE Sulawesi, but which occur in other parts of the island as indicated. This concerns species which I assume are absent from this region – of course, a final proof cannot be given. It is noted that only examples are given in the following table (Parts of Sulawesi: C – Central; E – East; N – North; S – South).

Papilionidae

Atrophaneura dixoni Grose-Smith, 1901 C N
Atrophaneura kuehni Honrath, 1886 C E N
Losaria palu Martin, 1912 C
Papilio jordani Fruhstorfer, 1906 N
Graphium euphrates Felder et Felder, 1862 S



Pieridae
***Delias* Hübner, 1819**

There are ten species of the genus in the Sulawesi region (Vane-Wright & de Jong 2003). However, there are no definitive reports of any of them for mainland Sulawesi Tenggara. Not a single *Delias* is listed by Jurriaanse and Lindemans (1920). Although the distribution maps for *D. kuehni* Honrath, 1886, *D. rosenbergi* Vollenhoven, 1865 and *D. zebuda Hewitson*, 1862 in Yata and Morishita (1985) at least partially cover SE Sulawesi, there is not any proof for their occurrence in that region; not a single definite locality is given. Also Martin (1920) does not report them for SE Sulawesi. However, *D. rosenbergi* is likely to occur in SE Sulawesi as there exists a subspecies, ssp. *munaensis* Nakano, 1988, on the islands Muna and Buton. As is often the case, taxa from these islands are also present on mainland SE Sulawesi. Furthermore, Yagishita et al. (1993) and also Vane-Wright and de Jong (2003) refer *D. rosenbergi* from SE Sulawesi.

Eurema irena Corbet, Pendlebury, 1932 C
Ixias piepersi Snellen, 1878 S
Ixias paluensis Martin, 1914 C
Cepora fora Fruhstorfer, 1897 C N S

Nymphalidae, Satyrinae
Lohora dinon Hewitson, 1864 S
Lohora anna Vane-Wright et Fermon, 2003 C
Lohora deianirina Fruhstorfer, 1897 C N
Lohora deianira Hewitson, 1862 N
Lohora imitatrix Martin, 1929 C
Lohora erna Fruhstorfer, 1898 S
Lohora tanuki Tsukada et Nishiyama, 1979 C E
Nirvanopsis hypnus Tsukada et Nishiyama, 1979 C E
Acrophthalmia windorum Miller et Miller, 1978 C N

Nymphalidae, Danainae
Parantica sulewattan Fruhstorfer, 1896 S
Parantica kuekenthali Pagenstecher, 1896 N

Nymphalidae, Charaxinae
Charaxes mars Staudinger, 1885 C N S

Nymphalidae, Nymphalinae
Cyrestis heracles Staudinger, 1896 C N

Discussion and concluding remarks

The butterfly fauna of Sulawesi has been studied by many entomologists with great interest. However, large areas such as SE and East Sulawesi have been largely excluded from the investigations, although the off-shore islands in these regions such as Buton, Muna and the Banggai archipelago attracted some interest. For understanding the zoogeography and evolution of the Sulawesi butterfly fauna, data from the neglected areas are needed. From their geological history, these two parts of Sulawesi are distinct as they are of different tectonic origin compared to West and North Sulawesi. The western and eastern block originate from different parts of Gondwanaland and were separated from each other for a long time period of about 200 Ma. The collision of both blocks is dated in the middle miocene, about 15 million years ago (Audley-Charles 1987). A third geological province of the Sulawesi region, recognized by Sukamto & Simandjuntak (1983), is the archipelago east of Sulawesi, i.e. the Banggai and Sula Islands. The islands south of SE Sulawesi, such as Buton and Muna, drifted separately from the eastern Sulawesi block as micro-continental blocks (Moss & Wilson 1998). The geological provinces, however, do not coincide with biogeographical entities. Based on the above presented results, the butterfly fauna of SE Sulawesi appears to be more closely related to that of the islands Buton and Muna than to neighbouring fauna of East Sulawesi. This is underlined by the common occurrence of specific taxa such as *Parthenos sylvia ornatrix*, *Cyrestis paulinus kransi* and *Lohora umbrosa* which are not found in other parts of Sulawesi. In addition, the trend for wing pattern darkening in certain butterflies is paralleled for these islands and SE Sulawesi. In terms of butterfly distribution it is therefore suggested to define parts of SE Sulawesi together with its southern off-shore islands a discrete zoogeographic entity within the Sulawesi region and to distinguish it from East Sulawesi.

The question arises now where there are the northern limits of this zoogeographic entity (Fig. 21). For answering this question, studies on the distribution of the following pairs of taxa or species will be helpful (most northern localities known so far for the first mentioned southeastern taxon are given in parenthesis):

Parthenos sylvia ornatrix (Uete) vs. *Parthenos sylvia salentia*.
Cyrestis paulinus kransi (Konawendepiha) vs.






Cyrestis paulinus mantilis.
Zethera incerta tenggara (Andamao) vs. *Zethera incerta incerta*.

It cannot be excluded that the three aforementioned subspecies from SE Sulawesi constitute species distinct from *P. sylvia, C. paulinus* and *Z. incerta*, respectively.

Lohora umbrosa vs. *Lohora decipiens* (Porabua). These are probably sister species (preliminary morphological and molecular data).

Cirrohroa recondita (Sambeani). A vicariant partner is not defined. The most related species is presumably *Cirrochroa eremita* Tsukada, 1985 which is known so far, however, only from North Sulawesi.

Unfortunately, there are no faunistic data on butterflies from the relevant regions which may include the borders or contact zones of the mentioned species or subspecies. Large areas of northern SE Sulawesi are obviously not explored entomologically, such as the Meluhu, Abuki, Matarombeo and Tangkelemboke Mountains. As a first working hypothesis, the Lawanopo fault which runs from the Gulf of Bone in the north across SE Sulawesi to close of Kendari on the east coast is selected as boundary so that the south-eastern zoogeographic entity can be defined as shown in Fig. 22. The northern demarcation in SE Sulawesi of the area is similar to that used by van Baalgooy (1987) for a plant geographical analysis. The area largely coincides with the central Sulawesi metamorphic belt (Hamilton 1979) but includes Buton, in addition. The Lawanopo fault system has been described in detail by Natawidjaja and Daryono (2015) so that the location of the prospective zoogeographical boundary can be easily retraced.

Another question concerns the evolutionary origin of the species of the southeast sub-region. For this, either the western or eastern block has to be considered as origin as the micro-continental blocks which later formed the off-shore islands could not have served as rafts carrying terrestrial species or biota from the Australian Plate because they were submerged for longer periods (Moss & Wilson 1998). On this background, the case of the Satyrine genus *Lohora* should be discussed here shortly. According to Kodandaramaiah et al. (2010) the genera *Lohora* and *Mycalesis* diverged about 24 Ma ago, which is before the collision of the western and eastern Sulawesi block. Species splitting processes within the *Lohora* radiation can be dated back to 3 Ma concerning for example the divergence between *L. transiens* Fruhstorfer, 1908 and *L. ophthalmicus* Westwood, 1888. Independent development of *Lohora* on the eastern and western block is not probable. However, a decision from which block the dispersal and following radiation started cannot be answered based on available data. Stelbrink et al. (2012) discussed possible dispersal and vicariance scenarios for Sulawesi and came to the conclusion that most Sulawesi taxa originate from Asian ancestors and thus invaded via the western block. A phylogenetic analysis of the genus *Lohora* will probably help to answer the questions concerning the evolutionary history of the species and to explain current distribution patterns. Similar analyses have to be performed for all Sulawesi butterfly species. The evolutionary history of the different taxa of the *Cyrestis cocles* group within the Sulawesi region appears particularly interesting. An Australian origin of *C. paulinus kransi* cannot be excluded as invasion via dynamic land connections as discussed by Stelbrink et al. (2012) is conceivable.

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Figure 21. Where to locate the contact zones of related allopatric taxa occuring in SE Sulawesi (A) or in the North of it (B)? Examples: *Parthenos sylvia ornatrix* (A) and *P. sylvia salentia* (B); *Cyrestis paulinus kransi* (A) and *C. paulinus mantilis* (B); *Zethera incerta tenggara* (A) and *Z. incerta incerta* (B).



Figure 22. The south-eastern zoogeographical unit of Sulawesi (shaded in dark grey). The Lawanopo fault system is assumed as northern boundary. The islands Buton (B), Muna (M), Kabaena (K) and Wowoni (W) are included in the unit. The still further southeast located islands of the Tukang Besi Archipelago may also be added but were omitted here due to the lack of data.

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Appendix

Table 3. List of localities including coordinates and altitudes.

Province / Locality	Latitude	Longitude	Altitude (m)
Sulawesi Tenggara			
Andamao	-3.699583	121.544417	140
Asenua	-3.7000	121.8000	138
Asolu	-3.738056	121.886944	60
Kendari	-3.945	122.4988889	150
Kolaka	-4.05	121.6	16
Kolaka, 20 km East of	-4.0421	121.709933	238
Konawendepiha	-3.714858	121.562856	115
Lasada	-3.716389	121.842778	156
Moramo	-4.1500	122.6333	148
Porabua	-3.734461	121.597403	110
Sambeani	-3.7579	121.9268	139
Silui	-3.736717	121.591133	270
Uete	-3.742853	121.624947	105
Sulawesi Selatan			
Bantimurung	-4.8433333	119.72	
Sumarorong	-3.147967	119.305772	920
Sulawesi Tengah			
Koyoan, Dowiwi	-1.04265	122.730483	211
Luwuk	-0.9333	122.7833	70






New *Australobolbus* H. Howden et J. Cooper, 1977 (Coleoptera: Geotrupidae: Bolboceratinae), with a key to Papuan species

Dmitry Telnov

Dārza iela 10, Stopiņu novads, LV-2130, Dzidriņas, Latvia; e-mail: anthicus@gmail.com

Abstract: A new species of genus *Australobolbus* H. Howden et J. Cooper, 1977 from Arfak Mountains, western New Guinea, is described. An annotated species list of *Australobolbus* is presented. An updated identification key to *Australobolbus* species from the Papuan region is provided.

Key words: Coleoptera, Geotrupidae, Bolboceratinae, *Australobolbus*, key to species, New Guinea, Australia.

Introduction

Australobolbus H. Howden et J. Cooper, 1977 is a Bolbocerine genus of 47 recent species and subspecies (including a new species described herein). *Australobolbus* is distributed all over the Australian mainland with nine species (including a new one) on New Guinea and satellite islands as well as on Tanimbar Islands (H Howden & J. Cooper 1977; H. Howden 1992; H. Howden et al. 2007). Two species, *Australobolbus cruciatus* H. Howden, 1990 and *A. loweri laratinus* (Arrow, 1916), are shared between the Australian (Queensland) and Papuan fauna. All other taxa show more restricted distribution (H. Howden et al. 2007). All the present distribution area of *Australobolbus* but Tanimbar Islands meets with the area of Sahul shelf. Tanimbar Islands have never been a part of Sahul and therefore were not connected with Australia and New Guinea in the past. The nearest distance between the Tanimbars and Sahul shelf nowadays is about 30 km - a distance relatively easy reachable for flying insects. According to a present classification of Scarabaeoid beetles (Smith 2006), the genus belongs to the tribe Australobolbini Nikolajev, 1996 of the Bolboceratinae Geotrupidae.

The main characters distinguishing *Australobolbus* from related Australian and Papuan genera are (H. Howden 1992; H. Howden et al. 2007) the wide scutellum, presence of seven elytral striae between the suture and humeral umbone and total body length below 13 mm. External sexual differences are not apparent in this genus. The New Guinea *Australobolbus* are usually dark brown or black or with the pronotum light brown and the head and elytra dark brown with few exceptions (*A. parvus* H. Howden, 1990 and *A. rotundatus* (Hope, 1841) have reddish brown to pale reddish body). In contrary, Australian representatives are mostly reddish or pale brown.

Australobolbus species are reported from arid grasslands to moist rainforest areas. In Australia, their habitat types range from wet coastal rainforests to moderately dry, open *Eucalyptus* forest and desert areas. These beetles were reported from sandy-loam or clay soils. On New Guinea, *Australobolbus* inhabit lowland and lower montane rainforests and were reported from up to 1510 m altitude (a new observation). Most if not all species in Australia are nocturnal (H. Howden et al. 2007). Papuan species were sampled in light traps, flight interception traps or at dung bait (H. Howden 1990). During our studies, the single specimen of *A. arfakianus* sp. nov. was collected at light set at the edge of primary lower montane rainforest in Arfak Mountains on Doberai Peninsula of New Guinea.

Papuan region used in the text means zoogeographic term in sense of Gressitt (1982), Beehler et al. (1986), and Telnov (2011). This area is defined as the Sahul continental shelf islands with the Pacific Ocean north and east of New Guinea and Torres Strait south of it. In the west, chains of Moluccan Islands (North, Central and South Moluccas) with high percentage of Papuan fauna elements are also considered part of the Papuan region with Weber's Line used as western boundary of the region as a line of fauna balance.






Taxonomic part

***Australobolbus arfakianus* sp. nov.** (Fig. 1, plate 92 figs 1-2)

http://zoobank.org/6E8A223C-767A-46FD-949C-A065AB75C835

Holotypus ♀ Naturkundemuseum Erfurt: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, Syoubri vill., 1°06'40S, 133°54'36"E, 1510 m, edge of secondary lower montane rainforest, 12-13.IX.2015, MV light, leg. D.Telnov.

Derivatio nominis: Toponymic. This species is named after Arfak Mountains, its area of occurrence.

Measurements, holotype ♀: Total body length 10.5 mm. Head 2.7 mm long, maximum width across genae 2.65 mm, pronotum at midline 3.5 mm long, maximum width at basal third 5.2 mm, elytra 3.9 mm long, maximum combined width at basal third 5.3 mm.

Colouration: Head dorsally reddish brown on labrum, clypeus and frons, black posterior to eyes. Antennae orange with dark brown club. Mouth parts dark red. Pronotum black. Scutellum black brown. Elytra very dark brown. Legs dark reddish-brown with paler femora. Underside of head orange, thorax reddish to reddish-brown, abdomen dark brown.

Description, female: Head opaque, shallowly impressed on frons. Labrum 1.4 times wider than long. Anterior margin truncate, provided with long yellowish setae. Labrum acute angulate at transverse midline, angulation less acute near lateral margins. Surface of labrum microscopically reticulate and with several short irregular longitudinal carinae derived from transversal angulation. Clypeus with anterior edge provided with dense comparatively short yellowish setae. Anterior and posterior carinae equally developed, well-defined. Anterior and posterior carinae merging at obtuse median tubercle (horn). Anterior carina on each side of tubercle arcuate. Posterior carina hardly arcuate, ending laterally in obtuse, well-defined tubercle. Lateral tubercles hardly less prominent than median one. With short obsolete longitudinal median carina arising from median horn and disappearing approximately at position line of lateral tubercles. Surface of clypeus coarse irregularly punctate, intervening spaces distinctly microscopically reticulate. Frons and anterior part of vertex concave, less coarse and more sparsely punctate and dense microscopically reticulate. Vertex with moderately elevated sinuate transverse carina across median half or more between eyes. Surface before and behind transverse carina feebly concave. Transverse carina not extending to lateral longitudinal carinae. Gena slightly longer than wide, outer anterior angle angulate, provided with little denticle. Surface of gena coarsely punctate and microscopically reticulate. Eyes large, finely facetted, deeply emarginated. Pronotum dorsally moderately convex, opaque. With indented longitudinal midline in anterior half, obsolete in basal half and only defined by narrow line of punctures reaching base of pronotum. Parallel indentation by irregular coarse punctures present on each side of midline in anterior half of pronotum in line with inner edge of eye. Lateral thirds of pronotum provided with dense very coarse and large punctures. Lateral and sides of basal margin provided with very long dense yellow setae. Scutellum broad, shiny, rounded apically, provided with dense moderate-sized punctures and very fine intermediary microreticulation. Elytra dorsally moderately convex, slightly shiny. Elytral striae deep, each stria with a row of small, longitudinal punctures separated by 1-4 diameters. Interstrial intervals moderately convex. 11th and 12th striae closely approximate anteriorly and merging. Epipleura provided with sparse delicate short yellowish pubescence. Legs: Protibia with 6 teeth on outer margin. Tarsi long. Femora and tibiae provided with extraordinary long yellow setae. Metasternum anteriorly between middle coxae wide, 0.7-0.8 mm. Its midline impressed. In lateral view metasternal surface highest anteriorly and medially before middle of coxae, surface then sloping downward to posterior face.

Dimorphism: The male is currently unknown.

Differential diagnosis: *Australobolbus arfakianus* sp. nov. is different from its congeners by the



Figure 1. *Australobolbus arfakianus* sp. nov., holotype ♀: head, dorsal view.

combination of the following characters: anterior and posterior carinae of clypeus equally developed, clypeus with median tubercle (horn) at merge place of anterior and posterior carinae, transverse carina of vertex moderately and evenly elevated (without higher lateral tubercles, e.g. not bituberculate), sinuate, extending over a half or more of intraocular distance, gena slightly longer than wide, dorsal body colouration very dark brown to black.
Ecology: The only known specimen was attracted at midnight to mercury vapour light set at clearing near the edge of primary lower montane rainforests at altitude of 1510 m (Plate 93). The specimen came to the light during a moderate rain.
Distribution: Only known from the locus typicus, Arfak Mountains of Doberai Peninsula, western New Guinea.

Annotated species list of Papuan *Australobolbus* H. Howden et J. Cooper, 1977

Notes: Species in the list arranged alphabetically, since no phylogenetic arrangement has been made. Page of description is given for each taxon after the author and year of description.

Geotrupidae Latreille, 1802: 142
Bolboceratinae Mulsant, 1842: 347
Australobolbini Nikolajev, 1996: 96

Australobolbus H. Howden, J. Cooper, 1977: 19
Type species: *Bolboceras obscurius* Blackburn, 1904, original designation.

Australobolbus arfakianus sp. nov.
Distribution: Indonesian New Guinea (Arfak Mountains, Doberai Peninsula of New Guinea).
Note: Known only from the holotype.

Australobolbus bacchusi H. Howden, 1990: 275
Distribution: Papua New Guinea (Central Cordillera, Adelbert Mountains & Huon Peninsula).

Australobolbus cruciatus H. Howden, 1990: 280
Distribution: Australia (Torres Strait Islands), Papua New Guinea (Papuan Peninsula).

Australobolbus latipennis H. Howden, 1990: 277
Distribution: Indonesian New Guinea (northern New Guinea W of Jayapura).

Australobolbus loweri laratinus (Arrow, 1916: 493)
Distribution: Australia (Queensland), Tanimbar Islands (Larat Island), Papua New Guinea (Transfly lowlands, Central Cordillera & Finisterre Mountains).

Australobolbus papuanus H. Howden, 1990: 274
Distribution: Papua New Guinea (Central Cordillera & Huon Peninsula).

Australobolbus parvus H. Howden, 1990: 281
Distribution: Papua New Guinea (Papuan Peninsula).
Note: Known only from the holotype.

Australobolbus rotundatus (Hope, 1841: 43)
Distribution: Australia (Northern Territory, Queensland), southern New Guinea (Transfly lowlands).

Australobolbus tricornis H. Howden, 1990: 278
Distribution: Papua New Guinea (Huon Peninsula).
Note: Known only from the holotype.

Identification key to *Australobolbus* H. Howden et J. Cooper, 1977 species from the Papuan region

This key is adapted from H. Howden (1990), with the addition of the new species and editorial corrections.

1 Vertex between or behind eyes with transverse carina, extending 1/3 or more of width of vertex and often with tubercle at each end. Vertex shallowly concave anterior to and sometimes posterior to carina 2
– Vertex with a pair of small horns or large tubercles near inner margin of eye. These horns not connected by transverse carina. Vertex usually concave between horns ..... *A. papuanus*
2 Clypeus with anterior and posterior carinae equally developed or anterior carina stronger than posterior. Species with or without median clypeal tubercle 3
– Clypeus with posterior carina well developed. Anterior carina feeble or obsolete. Median tubercle (horn) absent. Lateral tubercles absent or very poorly developed ..... *A. loweri laratinus*
3 Clypeus with distinct median tubercle or horn. Vertex with transverse carina on each side ending abruptly, usually delimited by small tubercle on each side. Labrum without V-shaped median carina (except in *A. tricornis* where V-shaped median carina present on labrum) .. 4
– Clypeus without distinct median tubercle. Vertex with transverse carina extending most of distance between longitudinal carina on each side above eye. Transverse carina feebly sinuate, gradually sloping downward at each end. Labrum with V-shaped median carina .... *A. latipennis*
4 Clypeus with tubercles moderately developed. Median tubercle (horn) connected to lateral tubercle on each side by well-developed carina. Labrum with median carina if present than not V-shaped 5
– Clypeus with tubercles strongly developed. Median tubercle (horn) connected to lateral tubercle on each side by feebly developed carina. Labrum with V-shaped median carina ..... *A. tricornis*






5 Vertex with transverse carina extending ¼ or more of intraocular distance 6
– Vertex with transverse carina short, extending less than ¼ of intraocular distance ..... *A. rotundatus*
6 Colour usually very dark brown. Vertex with transverse carina moderately to strongly elevated, extending approximately ¼–½ of intraocular distance. Protibia with 6 denticles on outer margin 7
– Colour reddish brown. Vertex with transverse carina feebly elevated, extending approximately ½ or more of intraocular distance. Protibia with 7 denticles on outer margin ..... *A. parvus*
7 Vertex with transverse carina distinctly bituberculate – feeble medially and delimited by stronger lateral tubercle on each side 8
– Vertex with transverse carina moderately elevated, not delimited laterally by stronger tubercles. Clypeus with anterior and posterior carinae merging at small median horn. Anterior carina on each side of tubercle arcuate. Posterior carina hardly arcuate. With short low longitudinal median carina arising from median horn and disappearing approximately at position line of lateral tubercles. Labrum with distinct long transverse carina .... *A. arfakianus* sp. nov.
8 Pronotum with midline impressed but lacking parallel line of punctures on each side in line with inner margin of each eye ..... *A. cruciatus*
– Pronotum with midline impressed and with longitudinal line or cluster of punctures on each side of the midline, approximately in line with inner margin of each eye ..... *A. bacchusi*

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Papuan *Chariochilus* (Coleoptera: Scarabaeidae: Melolonthinae), with description of *C. tamarau* sp. nov.

Dmitry Telnov

Dārza iela 10, Stopiņu novads, LV-2130, Dzidriņas, Latvia; e-mail: anthicus@gmail.com

Abstract: Papuan melolonthine *Chariochilus tamarau* sp. nov. is described and aditional description provided for *C. metallescens* Brenske, 1898. The checklist and key to *Chariochilus* species are presented for the first time.

Key words: Coleoptera, Scarabaeidae, Melolonthinae, *Chariochilus*, key to species, New Guinea, Australia.

Introduction

Chariochilus Brenske, 1898 is a small Melolonthinae genus that includes two Papuan (including a new species described herein) and one north Australian species. This genus was placed in the tribe Melolonthini by Dalla Torre (1912). Later, Britton (1979) established new synonymy: *Chariochilus* Brenske = *Lepidostethaspis* Arrow and *Chariochilus costipennis* Moser, 1908 = *Lepidostethaspis squamosus* (Lea, 1919), and moved this genus to the Xylonychini. Smith (2006) synonymised Xylonichini Britton, 1957 with Stethaspini Burmeister, 1855, where *Chariochilus* remained just for a few years until priority of Colymbomorphini over Xylonichini was claimed (e.g. Lawrence & Ślipiński 2013; Gunter et al. 2016).

Chariochilus metallescens has been originally described from a pair of specimens from Roon Island located offshore Wandammen Peninsula in western New Guinea. This species has not been reported since its original description and its distribution range and population trend remains unclear. Another Papuan species of *Chariochilus* discovered in Tamarau Mountains of Doberai Peninsula (western New Guinea) in 2012.

Chariochilus species inhabit rainforests. Recent New Guinea record is from lower montane rainforest at an altitude of about 1050 m.

The following combination of traits distinguishes *Chariochilus* from similar genera: mesosternal process elongate, rounded anteriorly, protruding forwards up to or over the anterior faces of the procoxae, antennal clubs 3- (in females) or 4- (in males) lamellate, terminal tarsomeres not spinose, labrum with distinct median excavation on anterior margin, protibiae bidentate on outer margin.

Taxonomic part

***Chariochilus metallescens* Brenske, 1898** (Fig. 1, plate 94 figs 1-4)

Syntypes 1♂ & 1♀ Naturkundemuseum Berlin: Roon [printed] / Coll. Brenske [printed] / Chariochilus metallescens type ... [handwritten, text partly unreadable].

Redescription: Generally agrees with the original description. Male aedeagus as in Fig. 1, parameres widened in lateral view. Photographs of this species presented here for the first time.

Sexual dimorphism: Female antennal club is 3-lamellate according the original description (Brenske 1898).

Distribution: Roon Island offshore Wandammen Peninsula, Bird's Neck Isthmus, western New Guinea.

***Chariochilus tamarau* sp. nov.** (Figs 2-6, plate 95 fig 1, plate 96 figs 1-2)

http://zoobank.org/C69C17A7-B9FE-4401-8851-1D1B3C48997E

Holotype ♂ Naturkundemuseum Erfurt: INDONESIA E, West Papua, Tamarau mts, ~12 km NW Fef vill. 00°46'05"S, 132°19'06"E, 1050 m, 12-13.II.2012, primary lower montane rainforest, MV light, leg. D. Telnov.

Paratype 1♂ collection Dmitry Telnov, Rīga: same label as in holotype.

Derivatio nominis: Toponymic. This species named after Tamarau Mountains, its area of occurrence.

Coloration: The forebody inclusive scutellum is pale coppery with metallic reflection, the elytra are reddish brown. Palps and antennomeres 1-4 (in females) or 5 (in males) are orange-brown, scape of









antennae brown. Legs are reddish-brown to brown, protibiae coppery with metallic reflection. The underside is reddish brown in the anterior half, the abdomen is brown.

Measurements, holotype: Total body length 19.8 mm. Head 3.5 mm long, maximum width across eyes 4.2 mm, pronotum at midline 3.8 mm long, maximum width postmedium 7.1 mm, elytra 12.5 mm long, maximum combined median width 0.93 mm.

Description: The head is smooth and glossy dorsally, slightly convex on clypeus. The labrum is 5 times wider than its length, with deep and broad median excavation on anterior margin, covered by coarse flat irregular punctures. The labrum is not pubescent. The anterior margin of the clypeus is truncate. The frontoclypeal suture is V-shaped. The intraocular distance is more than 2 times wider than eye length. The head dorsum is densely and large punctate, intervening spaces are mostly smaller than punctures, with very delicate microscopically striate. The anterior margin of the clypeus rugulose is punctate. A white to pale yellowish narrowly elongate suberect scale-like seta arises from each puncture. Very sparse longer erect yellow setae are scattered over surface of head. Club of male antenna is 4-segmented (Fig. 2). The scape is the longest among all antennomeres, widened distally. 5th antennomere provided with long denticle, about 3-4 times wider (inclusive denticle) than its length. The pronotum is hardly convex dorsally, smooth and glossy, almost twice wider than its length. Anterior angles are distinctly angulate. Basal angles are broadly rounded. Lateral margin is rounded, emarginate. Basal margin has broad obtuse median protruding against scutellum. Dorsum of the pronotum is densely and large punctate. Punctures are denser and coarser along the midline and become sparser laterally. Intervening spaces are very delicate microscopically striate, either equal to puncture diameters or several times larger than the punctures. A white narrowly elongate sub-erect scale-like seta arises from each puncture. Lateral margin presented with seven long erect yellow setae. Very sparse long erect yellow setae are scattered over surface of the pronotum. The scutellum is broadly triangular, smooth and glossy, with sparse punctures and scale-like setation similar to the pronotum. Dorsally, the elytra are moderately convex, smooth and glossy. Omoplates are moderately convex. Each elytron hardly impressed in apical fourth, the suture is slightly elevated over the elytral surface in this area. Each elytron has 14 very flat longitudinal striae exhibiting dense irregular punctures; of them 10 striae between the suture and shoulder. Interstrial intervals are weakly convex, presented with sparse punctures. The elytra are covered with dense white narrowly elongate (pointed) suberect scale-like setae. Therefore, the elytral pattern is longitudinally striate because elytral disc scales are sparser at interstrial intervals. There are several very sparse and scattered large and flat punctures all over the elytral disc, each having long erect yellow seta (Fig. 3). There are 9 such punctures and setae in the 1st striae. Legs: Protibia are comparatively short, bidentate on the outer margin. Metatarsi are long. Basal metatarsomere in males is 1.1-1.2 times longer than the longest spur of the metatibia. All femora and tibiae are covered with white scale-like setae of variable density, these setae are somewhat narrower and longer than those found on the dorsum. Meso- and metatarsi are also (although very sparsely) setose. The femora and tibiae are additionally presented with long yellow setae. The mesosternal process is elongate, rounded and somewhat widened anteriorly, protruding forwards up to or over the anterior faces of the procoxae, smooth and not pubescent (Fig. 6). Scale-like setation is especially dense on lateral parts of the sternites. The pygidium is rugulose punctured, broadly rounded on apical margin and exhibiting several extraordinary long yellow se-



Figure 1. *Chariochilus metallescens* Brenske, 1898 syntype ♂, aedeagus, lateral view (photo: C.-L. Li, 2017).

tae, provided with obtuse median carina not reaching apical third. Male aedeagus as on figs 4-5.
Sexual dimorphism: Female is unknown.
Differential diagnosis: *Chariochilus metallescens* is very close morphologically to the new species but male aedeagus is different, parameres strongly widened distally (consider Fig. 1).
Ecology: Specimens were attracted to mercury vapour light set at the edge of a primary lower montane rainforest (about 1050 m). The beetles flew to the light at midnight in drizzle conditions and at temperature about 15-18°C.
Distribution: Tamarau (= Tamrau) Mountains of Doberai Peninsula, western New Guinea.

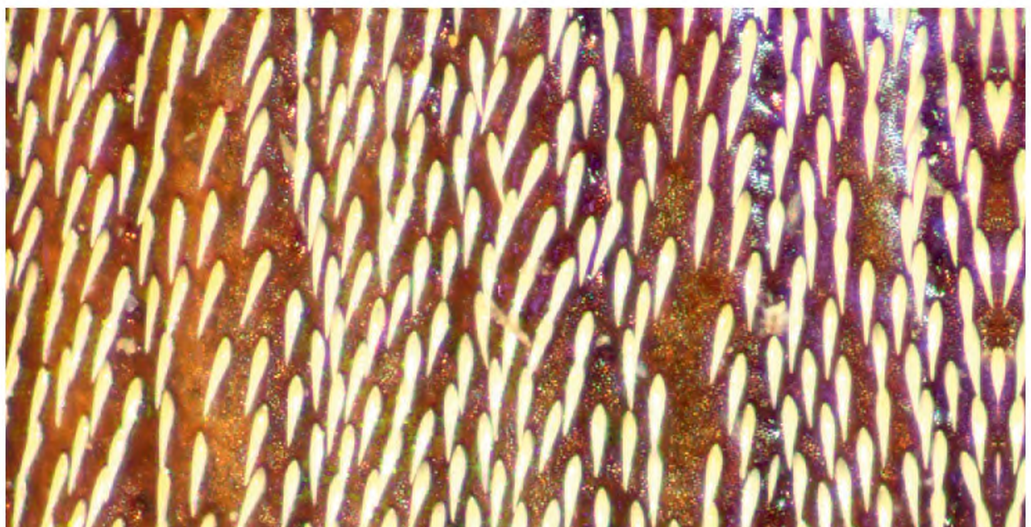
Annotated list of *Chariochilus* Brenske, 1898

Species are arranged alphabetically in the list, since phylogenetic relationships remain unknown. A page number with where original description indicated for each taxon after the year of description.

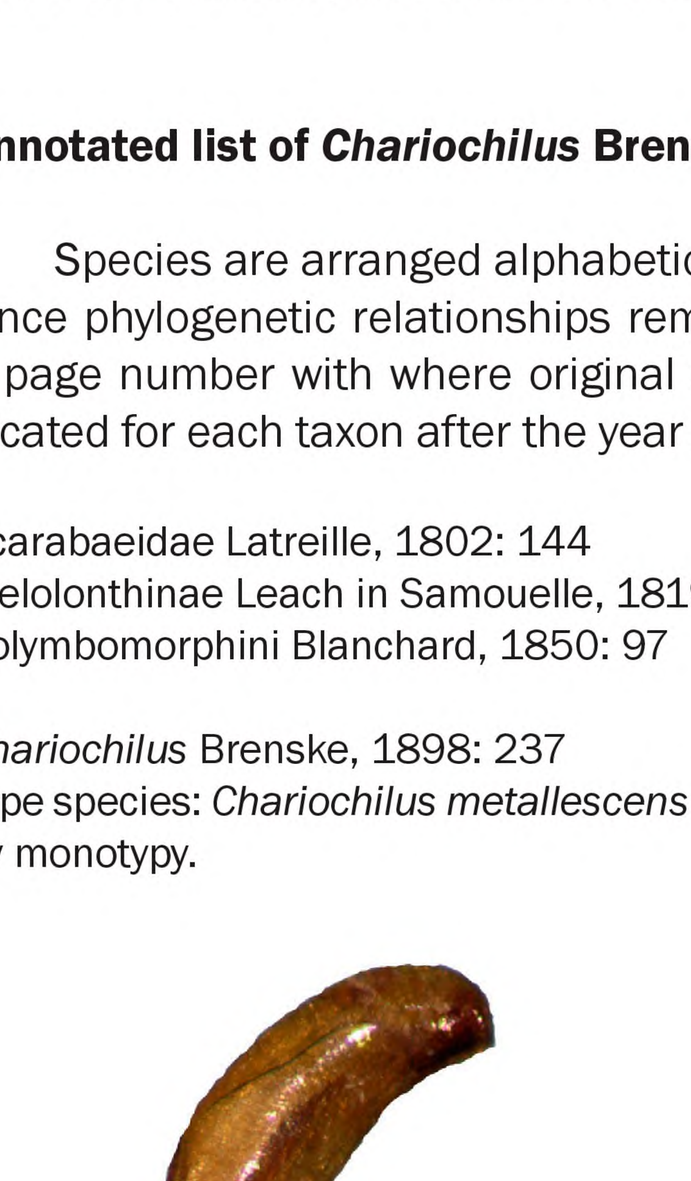
Scarabaeidae Latreille, 1802: 144
Melolonthinae Leach in Samouelle, 1819: 189
Colymbomorphini Blanchard, 1850: 97

Chariochilus Brenske, 1898: 237
Type species: *Chariochilus metallescens* Brenske, 1898, by monotypy.

= *Lepidostethaspis* Arrow, 1924: 547
Type species: *Stethaspis squamosus* Lea, 1919, by monotypy.



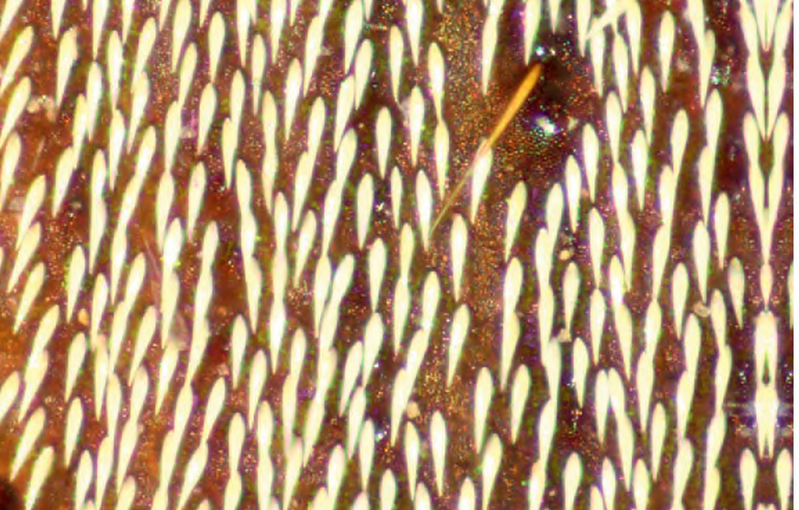
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4



5



3

Figures 2-5. *Chariochilus tamarau* sp. nov., holotype ♂. 2 – Elytral setation; 3 – Right antenna, dorsal view; 4 – Aedeagus, lateral view; 5 – ditto, ventral view.

Cariochilus costipennis Moser, 1908: 358
= *Stethaspis squamosus* Lea, 1919: 192
Distribution: Australia (Queensland).

Chariochilus metallescens Brenske, 1898: 237
Distribution: Indonesian New Guinea (Roon Island at Wandammen Peninsula, Bird's Neck Isthmus).

Chariochilus tamarau sp. nov.
Distribution: Indonesian New Guinea (Doberai Peninsula).

Identification key to *Chariochilus* Brenske, 1898

1 The pronotum evenly covered with uniform white scales, without smooth median line, elytral striae flat (shallow), their punctures sparse, interstrial intervals of elytra weakly convex, the underside pale brown with inconspicuous metallic reflection 2
– Lateral margins of the pronotum are covered with yellowish scales, median longitudinal line is free of scales, smooth, elytral striae are rather deep, their punctures dense, interstrial intervals of the elytra are strongly convex, the underside with dark metallic reflection .... *C. costipennis*



Figure 6. *Chariochilus tamarau* sp. nov., holotype ♂, head and thorax in ventral view.

2 Aedeagus as in Fig. 1, parameres widened in lateral view ..... *C. metallescens*
– Aedeagus as in Fig. 4, parameres not widened in lateral view ..... *C. tamarau* sp. nov.

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Dr. Chun-Lin Li (The Experimental Forest, National Taiwan University, Chu Shan) is thanked for providing valuable information and photographs of type specimens of *Chariochilus metallescens*.

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New records and new species of Macratriinae from the Papuan Region (Coleoptera: Anthicidae), 2

Dmitry Telnov

Dārza iela 10, Stopiņu novads, LV-2130, Dzidriņas, Latvia; e-mail: anthicus@gmail.com

Abstract: Descriptions of eight species of *Macratria* Newman, 1838 new to science are given, namely *M. ayamaru* sp. nov., *M. berdnikovi* sp. nov., *M. citak* sp. nov., *M. eparaksts* sp. nov., *M. marind* sp. nov., *M. patani* sp. nov., *M. obiensis* sp. nov., and *M. sahu* sp. nov. One new synonym is proposed: *Macratria subguttata* Pascoe, 1860 = *M. giloloana* Champion, 1916 syn. nov. Additional information on distribution, ecology and behaviour of several known species is given. Updated biogeographical data on Macratriinae of the Papuan Region and Wallacea zone are presented. Provisional areas of Anthicidae endemism are defined for Wallacea and the Papuan Region.

Key words: *Macratria*, Papuan Region, Wallacea, taxonomy, biogeography, areas of endemism, behaviour, ecology.

Introduction

The Indo-Australian transitional zone region (Wallacea and the Papuan Region) is extraordinary rich for Macratriinae. Previously 120 species have been recorded from this region (Telnov 2011a, 2012), of which 118 are believed endemic species and only two are shared with neighbouring islands of the Oriental Region. Of them, 108 species of *Macratria* Newman, 1838 were described from this region very recently (Telnov 2011a, 2012). This work is based largely on recent *Macratria* material from North Moluccas and New Guinea received in 2015-2016.

The following eight new species from North Moluccas and Indonesian New Guinea are described and illustrated: *Macratria ayamaru* sp. nov. (Doberai Peninsula), *M. berdnikovi* sp. nov., *M. patani* sp. nov. (both from SE Halmahera), *M. citak* sp. nov., *M. eparaksts* sp. nov., *M. marind* sp. nov. (all from South New Guinea), *M. obiensis* sp. nov. (Obi Islands), and *M. sahu* sp. nov. (NW Halmahera). One new synonym is proposed. New records from the region of the Indo-Australian transition zone are given for eight species. An attempt is made to define provisional areas of endemism for the Papuan and Wallacean Anthicidae on base of earlier works by the author.

Materials and methods

All species are listed alphabetically as a phylogenetic arrangement is not yet possible. For type specimens all label text is reproduced exactly, with no corrections or additions. All labels are printed. Each specimen is supplemented with additional label "MACRATRIA [species name, author, year or "sp. nov." respectively] det. D.Telnov, [year]. Type specimens of new species are also provided with an additional label on red paper "HOLOTYPUS" or "PARATYPUS", respectively. Holotypes of newly described species are placed in the collection of Naturkundemuseum Erfurt.

The specimens under study are all mounted on paper cards. When available, at least 3 males and 3 females from each locality were dissected and their genital organs were investigated. Within large series of specimens, merely random dissection has been performed. Genital organs were mounted on microscopic slides and fixed in Apáthy's gum-syrup to make the objects permanent. For morphological studies, a Leica S6D binocular stereomicroscope with attached external Canon EOS 450D SLR camera was used. Genital organs were studied and photographed using a Meji optical microscope with attached external digital camera for imaging. CombineZP software was used for image stacking. Last visible ventrites (largest terminal sternite and tergite) discussed by each species' description are the morphological sternite & tergite VII.

The "Papuan Region" is a zoogeographic term used in the sense of Gressitt (1982), Beehler et al. (1986), Riedel (2002), and Telnov (2011a). This area is defined as the Sahul continental shelf islands with the Pacific Ocean north and east of New







Guinea and Torres Strait south of it. In the west, chains of Moluccan Islands (North, Central and South Moluccas) with high percentage of Papuan fauna elements also considered part of the Papuan Region with Weber's Line used as western boundary of the region as a line of fauna balance. In parallel, these islands are also a part of Wallacea.

The maps are prepared using ArcGIS 9.0 software.

Abbreviations used in the text:

NME – Naturkundemuseum Erfurt, Germany;
DTC – Collection Dmitry Telnov, Rīga, Latvia;
vill. – village.

Taxonomic part

Macratria capreolus Telnov, 2011

New records: 44♂♀ DTC & NME: INDONESIA E, North Moluccas, Halmahera N, Galela area, river Kokopola at the bridge, 1°54'20"N, 127°49'41"E, 15 m, 01.VII.2013, lowland river, leg. D.Telnov; 22♂♀ DTC & NME: INDONESIA E, North Moluccas, central Halmahera, river between lake Sagea and Gemaf vill., 0°28'37"N, 128°03'11"E, 15 m, lowland river, 07.VII.2013, leg. D.Telnov; 1♀ & 1♂ DTC: INDONESIA E, North Moluccas, Obi Islands, Obira Is., W part, Kawasi vill. 5-6 km SE, North of Akelamo river mouth, 1°35'51"S, 127°25'04"E, 15.XII.2013, gardens, secondary lowland rainforest & swamp, leg. L.Wagner; 24 ♂♀ DTC & NME: INDONESIA E, North Moluccas, Obi Islands, Obira Is., S part, Wayaloar vill. NE ~4 km, 1°41'01"S, 127°36'13"E, 16.XII.2013, rainforest stream bank, on low strata vegetation, leg. L.Wagner; 6♂♀ DTC & NME: INDONESIA E, North Moluccas, Obi Islands, Obira Is., S part, Wayaloar vill. W, Wayaloar River, 1°42'42"S, 127°37'01"E, 17.XII.2013, riverine lowland rainforest, leg. L.Wagner; 20♂♀ DTC & NME: INDONESIA E, North Moluccas, central Halmahera, creek NE Kobe vill., 0°28'41"N, 127°53'53"E, 10 m, creek, 07.VII.2013, leg. D.Telnov; 5♂ & 1♀ DTC: INDONESIA E, North Moluccas, Halmahera SE, Patani W, Sibenpopo vill. E, 0°20'31"N, 128°32'02"E, 15 m, sago swamp & stream, 10.VII.2013, leg. D.Telnov; 6♂ DTC: INDONESIA E, North Moluccas, Halmahera NW, River Alce Diri near Jailolo, 01°06'28"N, 127°28'49"E, 15-17 m, 16.VII.2013, lowland river, leg. L.Wagner.

Note: Specimens from the Obi Islands are all missing the transverse band of white setae. In the Obi Islands specimen's elytra are covered with pale yellow, dense pubescence; the pubescence not getting denser postbasally and not building a setal band.

Ecology: Specimens were observed on low and medium strata vegetation (up to 2 m height) on the upperside and underside of leaves of *Piper* sp., *Saccharum* sp. (Fig. 48) and various young trees and bushes. Specimens were recorded from near water (riverbank in Galela and in central Halmahera near Gemaf, creek near Kobe vill. and at Sibenpopo vill., roadside near Sagea saline lake) or on a distance from it. Specimens were observed at midday in open sun in open or closed habitats. This species is reported at low altitudes from sea level up to 50 m.

Behaviour: It appears to be a very agile species, running quickly and flying actively from leaf to leaf when disturbed. When not disturbed, specimens were observed motionless or walking slowly and quickly move their palpi - "sniffing" the surface.

Distribution: These records are the first records since the original species description. This species was previously not recorded from Obi Islands, but is now distributed all over North Moluccas (Map 2: empty circles).

Macratria grekei Telnov, 2011

New records: 4♂♀ DTC: INDONESIA, Papua, North Asmat area, 5°20'39"S, 139°21'18"E, left bank of River Eilanden S of Siret and Brazza river junction (left riverbank), XII.2015, leg. L.Wagner.

Ecology: Specimens were sampled from *Saccharum* sp. riverside vegetation in open conditions (riverside) in open sun at hot midday time.

Distribution: This species inhabits vast areas in the South and West of New Guinea (Map 3: filled circles).

Macratria hatamensis Telnov, 2011

New records: 28♂♀ DTC & NME: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, Anggi Gigi Lake S env., Uper vill. 2-2,5 km NNE, 1°17'10"S, 133°54'18"E, 09.IX.2015, 1900-2480 m, primary mid montane rainforest, leg. D.Telnov; 60♂♀ DTC & NME: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, montane ridge between lake Gita & Gigi (Anggi Lakes), 1°23'33"S, 133°55'02"E (2360 m) via 1°22'40"S, 133°55'56"E (2280 m) to Pamaha vill. 1°23'14S, 133°55'11"E (1960 m), 10.IX.2015, 2200 m, primary mid montane rainforest & subalpine vegetation, leg. D.Telnov.

Note: Females of this species are either entirely brown as the paratype (see Telnov 2011a) or with black-brown fore-body.

Ecology: This species occurs in mid-montane rainforests and is presently known from altitudes diapason 1900-2480 m. Specimens were observed in very damp cloud conditions on low strata vegetation (up to 1.5 m height) in shady or dark condi-






tions. Specimens were observed both in very dark closed-canopy primary rainforest as well as in the partially open zone of low trees on montane ridges (Figs 46-47).

Behaviour: Specimens are slow and not agile even at midday (midday temperatures at places of observation about 22-25 °C, midnight temperatures 5-10 °C). Beetles sat motionless on the upper sides of leaves when not disturbed. When disturbed they did not fly away like other previously observed congeners, but fell down to the ground instead. When falling, the beetle bends its head and pronotum forward almost perpendicular to the body) and folds its legs. While on the ground, they remain motionless for some time. This kind of behaviour is very peculiar and has not been reported for any other *Macratria*. I consider it adaptive to the specific (cool) climate of mid-montane rainforests.

Distribution: These are the first records since the original species description. This species appears to be limited to the Arfak Mountains of New Guinea's Doberai Peninsula (Map 1: empty circles).

***Macratria pygmaea halmaherica* Telnov, 2011**

New records: 14♂♀ DTC & NME: INDONESIA E, North Moluccas, Halmahera N, Galela area, river Kokopola at the bridge, 1°54'20"N, 127°49'41"E, 15 m, 01.VII.2013, lowland river, leg. D.Telnov; 5♂ DTC: INDONESIA E, North Moluccas, central Halmahera, lake Sagea near Sagea vill., 0°28'43"N, 128°04'31"E, 5 m, 07.VII.2013, roadside vegetation, leg. D.Telnov.

Ecology: Specimens were observed on low and medium strata vegetation (up to 2 m height) on the upperside and underside of *Saccharum* sp. (Fig. 48) leaves. Specimens were recorded from near water (riverbank in Galela). Specimens were observed during the hot midday in the open sun (Fig. 51). This species is reported from low altitudes up to 150 m.

Behaviour: Agile species, walking quickly and flying actively from leaf to leaf when disturbed. When not disturbed, specimens remained motionless.

Distribution: These are the first records since the original species description (Map 3: empty circles).

***Macratria riparia* Telnov, 2012**

Ecology: Telnov (2012: 438) provided ecological information on this species but its connection with any particular plant species remained unknown until now. *Cryptocoryne ciliata* (Roxb.) Schott is identified as a plant on which leaves adults of *M. riparia* are so abundant.

***Macratria ronaldi* Telnov, 2011**

New records: 1♂ DTC: INDONESIA, Papua, Korowai area, Yaniruma env., 5°24'53"S, 139°49'01"E, 25.VI.2016, muddy riverside, on *Metroxylon sagu*, leg. L.Wagner.

Ecology: A specimen was sampled from a Sago Palm leaf.

Distribution: This represents the first record since the original species description. This species seems to inhabit vast areas in the South of New Guinea from Bird's Neck isthmus in the West toward at least Korowai area in the East (Map 5: empty circle).

***Macratria rotundiceps* Telnov, 2011**

New records: 1♂ & 1♀ DTC: INDONESIA E, W New Guinea, Doberai Peninsula, Arfak mts, Syoubri vill., 1°07'16S, 133°54'34"E, 1570-2100 m, primary lower montane rainforest, 11-12.IX.2015, leg. D.Telnov.

Ecology: Specimens were observed on low strata vegetation (about 1.5 m height) in a closed canopy primary mid-montane rainforest. Both sampled specimens were observed on the same leaf of a young tree (Fig. 49).

Distribution: This is the first record since the original species description. This species appears to be limited to the Arfak Mountains of New Guinea's Doberai Peninsula (Map 1: filled circles).

***Macratria subguttata* Pascoe, 1860**

= *Macratria giloloana* Champion, 1916 **syn. nov.**

New records: 1♂ & 1♀ DTC: INDONESIA E, North Moluccas, Tidore Is., caldera of Sabale volcano, 0°43'18"N, 127°26'04"E, ~400-410 m, 29.VI.2013, secondary lowland rainforest, low strata vegetation [Taro plant], leg. D.Telnov; 10♂♀ DTC & NME: INDONESIA E, North Moluccas, Halmahera N, Galela area, river Kokopola at the bridge, 1°54'20"N, 127°49'41"E, 15 m, 01.VII.2013, lowland river, leg. D.Telnov; 36 ♂♀ DTC & NME: INDONESIA E, North Moluccas, Halmahera N, Galela area, Lake Makete at Makete vill., 1°50'17"N, 127°48'32"E, 20 m, 01.VII.2013, lakeside, on *Alocasia macrorrhizos*, leg. D.Telnov; 4♂♀ DTS & NME: INDONESIA E, North Moluccas, central Halmahera, river between lake Sagea and Gemaf vill., 0°28'37"N, 128°03'11"E, 15 m, lowland river, 07.VII.2013, leg. D.Telnov; 8♂♀ DTC: INDONESIA E, North Moluccas, central Halmahera, creek NE Kobe vill., 0°28'41"N, 127°53'53"E, 10 m, creek, 07.VII.2013, leg. D.Telnov; 11♂♀ DTC: INDONESIA E, North Moluccas, Halmahera SE, Patani W, between the jetty & Patani, 0°18'10"N, 128°39'38"E, 15-50 m, secondary lowland rainforest, 10.VII.2013, leg. D.Telnov; 19♂♀ DTC & NME: INDONESIA E, North Moluccas, Halmahera NW, distr. Gamlamo, subdistr. Sahu Timur, 1°07'54"N,









127°28'26"E, 15-20 m, 16.VII.2013, lowland swamp, leg. L.Wagner; 6♂ DTC: INDONESIA E, North Moluccas, Halmahera NW, River Alce Diri near Jailolo, 01°06'28"N, 127°28'49"E, 15-17 m, 16.VII.2013, lowland river, leg. L.Wagner.

New synonym: *Macratria giloloana* Champion, 1916 (Halmahera Island) was placed as junior synonym of *M. coniceps* Pic, 1901 (Aru Islands) by Telnov (2011a: 128) primarily because of the head being slightly constricted in the holotype (♂) of *M. giloloana* making the head outline similar to that of *M. coniceps*. Later one was described from 5 female specimens. After examining large series of specimens from W and N Halmahera and Tidore and comparing them with *M. subguttata* Pascoe (Bacan, Halmahera, Ternate) I came to the conclusion that the male characters of these specimens are identical with those of the holotype of *M. giloloana,* and the head posterior to eyes is inconspicuously constricted in some specimens and rounded in most specimens. Therefore, I conclude all these specimens are conspecific.
Morphology: The apices of the antlers-like appendages therefore look obtusely bilobate (Fig. 1) [not visible on figures 74 & 447 in Telnov (2011a)]. The antlers-like appendages bear a group of 2-3 delicate, extraordinary long setae arising from near the place of the protruding insertion.
Ecology: Specimens were observed on low and medium strata vegetation (up to 2 m height) on the upperside (rarely also on the underside) of leaves of various young trees, *Saccharum* sp. and on Giant Taro (*Alocasia macrorrhizos*) and other Taro (Figs 48, 50, 52). Specimens were recorded from near water (lakeside and riverbank in Galela and in central Halmahera near Gemaf, a lowland swamp in Sahu Timur, Halmahera; stream in caldera on Tidore). Specimens were observed at hot midday, both in disturbed and semi-open habitats (lakeside, riverbank, swamp) and in closed canopy habitats (old secondary lowland rainforest). This species is reported at altitudes from sea level up to 410 m.
Behaviour: A very agile species, running quickly and flying actively from leaf to leaf when disturbed. When not disturbed, specimens were observed motionless or walking slowly and quickly moving their palpi - "sniffing" the surface.
Distribution: This is a widespread species across North Moluccas, not recorded on Obi Islands (Map 3: filled circles).
Distribution & note *M. coniceps*: This species remains known only from the Aru Islands (Tanahbesar Island, exact locality unknown) and male characters of this species are unknown.



Figure 1. *Macratria subguttata* Pascoe, 1860, ♂ from Sabale caldera, Tidore Island: distal part of last visible sternite in ventral view. Note the bilobate apices of the appendages (Important! Pubescence of the appendages is removed on this photograph to ensure better view).

Descriptions of new taxa

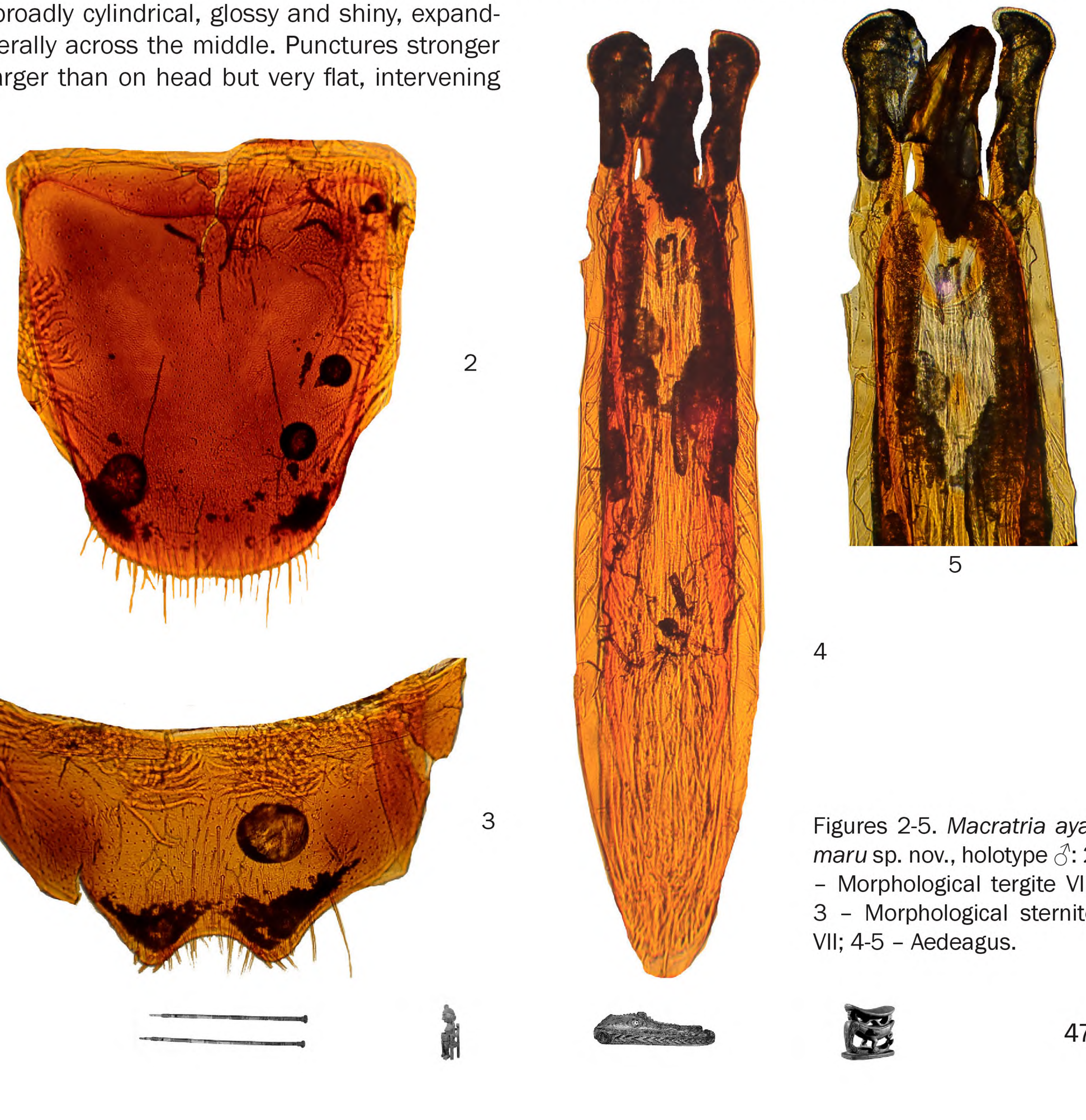
***Macratria ayamaru* sp. nov.** (Figs 2-5, plate 97 figs 1-2, map 6: rhomboid)
http://zoobank.org/0E384018-D116-4642-8D43-5C08B018862A
Holotype ♂ NME: INDONESIA E, W New Guinea, Doberai Peninsula, Ayamaru vill. 2,5-2,1 km NW, forest & Framu creek, 1°15'30S, 132°11'13"E, ~310-265 m, 02.IX.2015, primary semidry lowland rainforest on limestone, leg. D.Telnov.
Paratype 1♂ DTC: same label as in holotype.

This species belongs to the *M. beccarii* species-group (see Telnov 2011a for group definition).
Derivatio nominis: Toponymic. This species is named after the Ayamaru area of the Doberai Peninsula, New Guinea. Noun in apposition, invariable.
Measurements: Holotype male, total body length 5.24 mm, maximum combined width across base of elytra 1.2 mm; head (neck excluded) 0.9 mm long, across eyes 0.8 mm broad, pronotum 1.35 mm long, maximum width 0.8 5 mm, elytra 2.9 mm long, across base 1.2 mm wide. Paratype male: total body length 5.1 mm, across base 1.25 mm wide; head 0.9 mm long, across eyes 0.75 mm broad, pronotum 1.3 mm long, maximum width 0.9 mm, elytra 2.9 mm long, across base 1.25 mm wide.
Description: Fore-body dorsally black or black-brown, elytra brown. Head reddish prior to eyes with yellow mouthparts. Antennomeres 1-8 yellow, 9-11 black. Pronotum and elytra with inconspicuous

blue metallic lustre. Pro- and median legs yellow to yellowish brown, hind legs brown with metafemora paler. Underside brown to dark brown. Head rhomboid, smooth and shiny dorsally, with very large and prominent eyes covering 2/3 of head sides. Tempora converging toward narrow and broadly medially notched base. Frons broad, in both sexes distinctly broader than combined length of two basal antennomeres. Punctures minute and dense, intervening spaces mostly smaller than punctures. Underside of head smooth and shiny, with very delicate punctures. Pubescence yellowish, very delicate and sparse, subdecumbent. Antennae with three terminal antennomeres strongly enlarged, reaching base of elytra. Basal antennomere cylindrical. Third antennomere 1/3 longer than second antennomere. Antennomeres 3-7 elongate and not thickened distally. Antennomere 8 short and widened distally but longer than broad. Antennomeres 9-11 in male strongly enlarged and elongate (antennomeres 9-11 are longer than items 1-8 combined). Terminal antennomere 1/5 longer than penultimate one. Terminal maxillary palpomere cultriform. Pronotum broadly cylindrical, glossy and shiny, expanded laterally across the middle. Punctures stronger and larger than on head but very flat, intervening spaces as wide as or smaller than punctures. Pubescence golden, long but sparse, appressed. Basal groove without dense whitish pubescence. Scutellum small, truncate apically. Elytra rather broad, slightly narrowed toward apices. Punctures large but flat, arranged into 6 poorly delimited rows on each elytron (by dorsal view). Punctures getting much more flat and more delicate in apical third. Pubescence yellowish, fine and long, rather dense, appressed, directed in part slightly obliquely. Hind wings fully developed. Legs stout, densely setose. Pro- and mesotarsi distinctly thickened in both sexes. Basal metatarsomere in males longer than combined length of metatarsomeres 2-4. Last visible ventrites are not extending beyond elytral apices. Male morphological tergite VII very broadly rounded apically (Fig. 2). Male morphological sternite VII with broad median excavation provided with two enlarged, scale-like setae on each side of the excavation (Fig. 3). Aedeagus with distally widened somewhat spatulate parameres (Figs 4-5).

Sexual dimorphism: The female is unknown.

Ecology: Specimens were sampled from low strata



Figures 2-5. *Macratria ayamaru* sp. nov., holotype ♂: 2 – Morphological tergite VII; 3 – Morphological sternite VII; 4-5 – Aedeagus.

vegetation on the edge of a semidry lowland rainforest on limestone, during the very hot midday time.
Differential diagnosis: Among its congeners this species is primarily distinctive due to the combination of the following characters: antennomeres 7-8 longer than broad and not flattened, elytral pubescence in part directed obliquely laterally, male morphological sternite VII with broad apical excavation provided with two scale-like setae on each side of median excavation.
Distribution: Southern lowlands of Doberai Peninsula, Indonesian New Guinea.

***Macratria berdnikovi* sp. nov.** (Figs 6-9, plate 97 figs 3-4, map 4: filled circle)
http://zoobank.org/2D1EC0E4-670F-4736-BB4A-8D0B2B454B5B
Holotype ♂ NME: INDONESIA E, North Moluccas, Halmahera SE, Patani W, between the jetty & Patani, 0°18'10"N, 128°39'38"E, 15-50 m, 10.VII.2013, secondary lowland rainforest, leg. D.Telnov.
Paratype 1♂ DTC: same label as in holotype.

Derivatio nominis: Patronymic. This species is named in honor of Dr. Sergejs Berdnikovs, Northwestern University (Chicago, U.S.A.), professor and my good friend.
Measurements: Holotype male, total body length 3.5 mm, maximum combined width across base of elytra 0.8 mm; head 0.75 mm long, across eyes 0.6 mm broad, pronotum 0.85 mm long, maximum width 0.55 mm, elytra 1.9 mm long, across base 0.8 mm wide.
Description: Head yellow on mouthparts, orange from clypeus to eye midflight, black in posterior half. Antennae yellow with three terminal antennomeres yellowish brown. Pronotum and elytra uniformly black. Front legs yellow, profemora with small triangular brown predistal spot and base of protibiae shortly brown, procoxae reddish. Median legs with reddish coxae, mesofemora yellow with distal third dark brown (leaving extreme apices narrowly yellow), mesotibiae black to black-brown but distally narrowly reddish, mesotarsi yellow. Hind legs inclusive coxae black, metafemora with extreme apices narrowly yellow, basal metatarsomere dark reddish brown, remaining metatarsomeres yellow. Underside of head and thorax reddish, abdomen dark brown to black. Head ovoid, smooth dorsally, with very large and strongly prominent eyes covering whole sides of head. Head base rounded, not notched. Frons narrow, in male narrower than combined length of two basal antennomeres. Punctures minute, rather dense, intervening spaces generally larger than punctures. Underside of head smooth and shiny, minutely punctured. Pubescence yellowish, dense, appressed. Antennae slender, in male reaching basal third of elytra. Basal antennomere cylindrical. Third antennomere hardly longer than second antennomere. Antennomeres 3-8 elongate and slender, hardly thickened distally. Antennomeres 9-10 stouter but not longer than antennomeres 3-8. Terminal antennomere in male elongate, twice longer than the penultimate antennomere. Terminal maxillary palpomere cultriform. Pronotum cylindrical, flattened and shiny dorsally. Punctures large and dense but flat, intervening spaces microreticulate, smaller than punctures. Pubescence greyish to whitish, long and dense, appressed. Area adjacent to the basal groove with dense whitish pubescence. Scutellum small, truncate apically. Elytra shiny dorsally, laterally almost parallel. Dorsal surface densely and coarsely punctate in basal half but getting more delicate and flat in apical half. Pubescence greyish to yellowish, rather long and dense, appressed. Broad transverse band of white hairs in basal third, narrowly interrupted on suture. Hind wings fully developed. Legs stout, tibiae densely setose. Protibiae rather short and stout. Pro- and mesotarsi distinctly thickened in male. Spurs of metatibiae long and stout. Male basal metatarsomere longer than combined length of metatarsomeres 2-4. Apices of last visible ventrites not extending beyond elytral apices. Male morphological tergite VII broadly rounded apically and obtuse pointed medially (Fig. 6). Male morphological sternite VII short and broad, with very inconspicuous medioapical excavation (Fig. 7). Aedeagus with short and thin, apically slightly widened parameres (Figs 8-9).
Sexual dimorphism: The female is unknown.
Ecology: Sampled from low strata vegetation in a secondary lowland rainforest.
Differential diagnosis: This species is very conspicuous primarily due its colouration (thus *Macratria* are known as rather variable in body colouration) and structure of male genital organs and last ventrites.
Distribution: Known from the SE arm of Halmahera Island, North Moluccas.

***Macratria citak* sp. nov.** (Figs 10-15, plate 97 figs 5-6, map 6: empty circle)
http://zoobank.org/68512989-F857-461B-BE04-98EBE793A4A7
Holotype ♂ NME: INDONESIA, Papua, North Asmat area, 5°20'39"S, 139°21'18"E, left bank of River Eilanden S of Siret and Brazza river junction (left river-








6



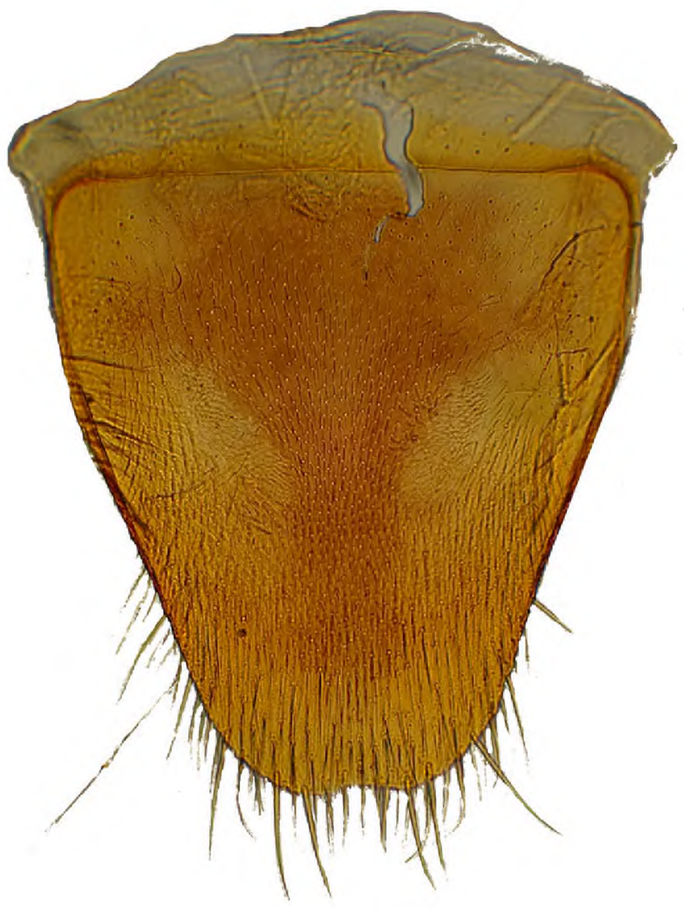


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Figures 6-9. *Macratria berdnikovi* sp. nov., holotype ♂: 6– Morphological tergite VII; 7 – Morphological sternite VII; 8-9 – Aedeagus.





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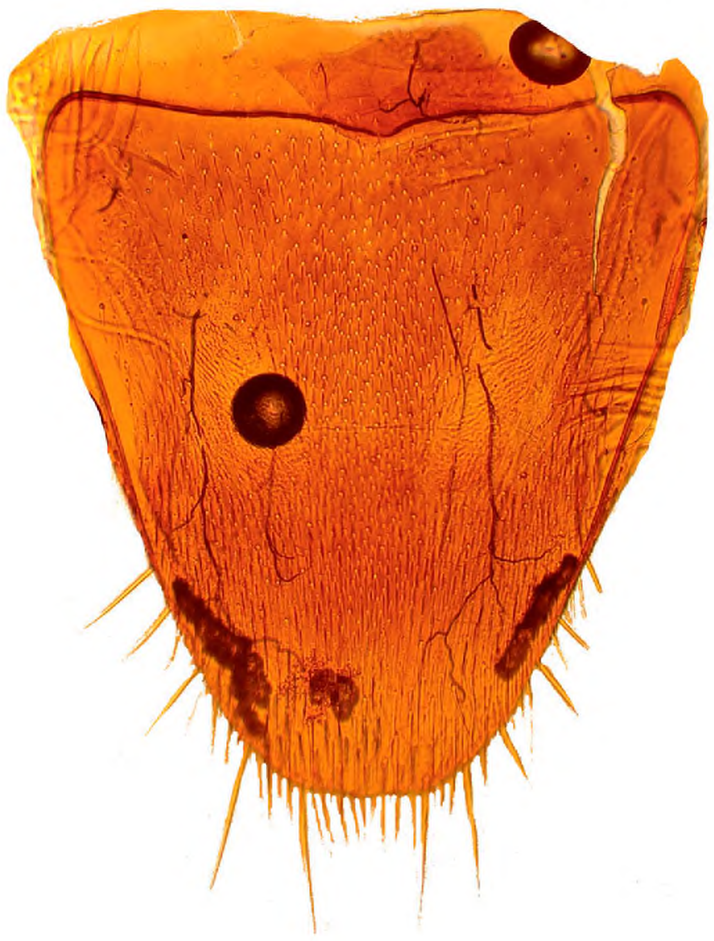
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Figures 10-11. *Macratria citak* sp. nov., paratype ♂: 10– Morphological tergite VII; 11 – Morphological sternite VII.



bank), XII.2015, leg. L.Wagner.
Paratypes: 7♂ & 1♀ DTC: same label as in holotype.

This species belongs to the *M. gestroi* species-group (see Telnov 2011a for group definition).
Derivatio nominis: Named after Citak, local tribe and language at the area where this species was first collected. Noun in apposition, invariable.
Measurements: Holotype male, total body length 4.8 mm, maximum combined width across base of elytra 1.05 mm; head 0.9 mm long, across eyes 0.75 mm broad, pronotum 1.1 mm long, maximum width 0.7 mm, elytra 2.6 mm long, across base 1.05 mm wide. Paratype female, total body length 4.4 mm, maximum combined width across base of elytra 1.1 mm; head 0.8 mm long, across eyes 0.7 mm broad, pronotum 1.1 mm long, maximum width 0.7 mm, elytra 2.3 mm long, across base 1.1 mm wide.
Description and differential diagnosis: Dorsal body black with orange legs (all femora orange-brown in female paratype) with orange-brown coxae, yellow mouth parts and antennomeres 1-7; antennomeres 8-11 brown. Underside dark brown, abdomen reddish brown. This species is very similar with *Macratria gestroi* Pic, 1900 (Papuan Peninsula, E Papua New Guinea) and *M. pseudodensata* Telnov, 2012 (southern lowlands of New Guinea), but differs specifically in structure of male morphological tergite VII (pointed in *M. pseudodensata*, truncate in *M. gestroi*, broadly rounded and excavated medially in *M. citak* sp. nov (Fig. 10) and male morphological sternite VII (flattened / truncate between processes in *M. pseudodensata*, with a small median pubescent process in *M. gestroi*, with a broad pubescent process in *M. citak* sp. nov. (Fig 11). Male aedeagus as in Figs 12-13. Female morphological sternite VII pointed apically (Fig. 15), tergite VII - as in Fig. 14. Male terminal antennomere elongate, longer than combined length of 9-10 antennomeres.
Sexual dimorphism: Female with terminal antennomere comparatively shorter, as long as combined length of two preceding antennomeres.
Ecology: Specimens were observed on *Saccharum* sp. vegetation on riverside (plants growing in



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Figures 12-15. *Macratria citak* sp. nov. 12-13 – Aedeagus, paratype ♂; 14 – Morphological tergite VII, paratype ♀; 15 – Morphological sternite VII, paratype ♀.

water) in the open sun at hot midday.
Distribution: Southern (Indonesian) New Guinea lowlands - hitherto known from North Asmat area.

***Macratria eparaksts* sp. nov.** (Figs 16-22, plate 98 figs 1-6, map 6: filled circles)
http://zoobank.org/7712554F-3157-4D2A-B770-F639656BEB15
Holotype ♂ NME: INDONESIA E, S New Guinea, Merauke 84 km NE, Sawaeoe vill. 4 km S, Marov riverbank (upper Merauke River), 8°02'36"S, 141°00'14"E, 18.IX.2015, 13-14 m, riverside vegetation, leg. D.Telnov. Paratypes 15 specimens: 2♂ DTC: same label as in holotype; 5 DTC & 2 NME: INDONESIA, Papua, Korowai area, Yaniruma env., 5°24'53"S, 139°49'01"E, 25.VI.2016, muddy riverside, on *Metroxylon sagu*, leg. L.Wagner; 4 DTC & 2 NME: INDONESIA, Papua, Korowai area, Senggo vill. env., 5°45'36"S, 139°32'52"E, 25.VI.2016, riverside vegetation, leg. L.Wagner.

This species belongs to the *M. gestroi* species-group (see Telnov 2011a for group definition).
Derivatio nominis: For the first time in biological science, the discovery of *Macratria eparaksts* sp. nov. was fixed on the photograph which was immediately (in the field) signed by the qualified electronic signature with timestamp provided by LVRTC, Latvia's only Trusted certification services provider. Satellite phone was used in the field in order to access LVRTC's on-line signing services. This species is therefore named after the Latvian electronic signature brand "eParaksts" (eSignature in English translation). Noun in apposition, invariable.
Measurements: Holotype male, total body length 4.3 mm, maximum combined width across base of elytra 0.9 mm; head 0.8 mm long, across eyes 0.7 mm broad, pronotum 0.95 mm long, maximum width 0.6 mm, elytra 2.35 mm long, across base 0.9 mm wide. Selected ♀♀ paratypic specimens from Yaniruma env.: Total body length 4.6 mm, maximum combined width across base of elytra 1 mm; head 0.9 mm long, across eyes 0.75 mm broad, pronotum 1.1 mm long, maximum width 0.7 mm, elytra 2.5 mm long, across base 1 mm wide; total body length 3.7 mm, maximum combined width across base of elytra 0.8 mm; head 0.7 mm long, across eyes 0.6 mm broad, pronotum 0.9 mm long, maximum width 0.55 mm, elytra 2 mm long, across base 0.8 mm wide.
Description: Dorsal body uniformly black, mouthparts yellowish brown. Antennae yellow basally with 5 terminal antennomeres black. Front legs yellow with coxae, profemora pale brown distally and protibiae - basally. Median legs inclusive coxae brown with mesofemora mainly yellow with exception of darker distal part. Hind legs black brown, metatarsi somewhat paler. Underside brown to black-brown. Head round, smooth and shiny dorsally, with very large and strongly prominent eyes covering whole sides of head. Head slightly converging posterior to eyes to narrower not notched base. Frons narrow, in male about as wide as combined length of two basal antennomeres. Punctures minute, rather dense, intervening spaces generally larger than punctures. Underside of head smooth and shiny, minutely punctured. Pubescence whitish, dense, appressed. Antennae in male reaching base of elytra. Basal antennomere cylindrical. Third antennomere hardly longer than second antennomere. Antennomeres 3-5 slender, hardly thickened distally. Antennomeres 6-10 stouter, broader and flattened dorsoventrally. Terminal antennomere in male elongate, twice longer than the penultimate antennomere and as long as 9-10 antennomeres combined, in female slightly shorter than 9-10 antennomeres combined. Terminal maxillary palpomere shortly cultriform. Pronotum cylindrical, dorsally slightly convex and shiny. Punctures large and dense but flat, intervening spaces smooth, smaller than punctures. Anterior third of pronotum more delicate punctured than posterior 2/3. Pubescence yellowish to whitish, long and dense, appressed. Basal groove with dense white pubescence. Scutellum small, truncate apically. Elytra shiny dorsally, laterally slightly constricted toward apices. Dorsal surface finely and flat punctate. Pubescence yellowish, rather long and dense, appressed. Transverse band of white hairs in basal third, broadly interrupted on suture. Hind wings fully developed. Legs stout, tibiae densely setose. Protibiae stout. Metatibiae with a group of very long curved setae on premedian part of inner margin. Spurs of metatibiae long and stout. Male basal metatarsomere longer than combined length of metatarsomeres 2-4. Apices of last visible ventrites extending beyond elytral apices. Male morphological tergite VII narrowly pointed apically (Fig. 16), female morphological tergite VII broadly rounded apically (Fig. 21). Male morphological sternite VII with two long and robust antlers-like lateral processes with densely setose triangular median protrusion on inner margin of each process. Apex of the median protruding is tripartite (this character is visible under strong magnification). Apical margin is strongly protruding and pointed between processes (Figs 17-18), provided with 2-3 large, scale-like setae. Female morphological sternite VII with an obtuse flat medio-apical projection (Fig.22). Aedeagus as in Figs 19-20.
Sexual dimorphism: Females have a shorter ter-

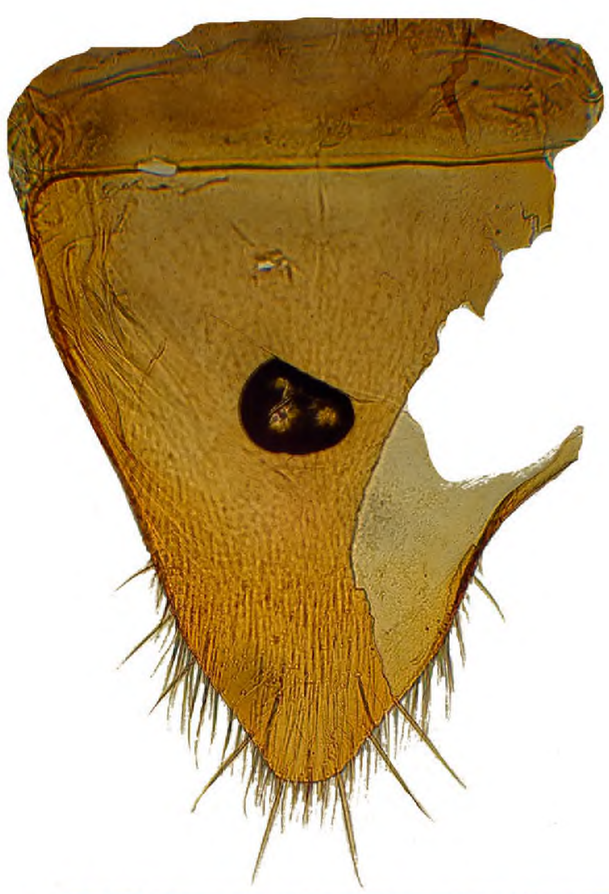





minal antennomere.

Ecology: This species was sampled from leaves of a lone standing tree on riverbank. Beetles sat on the upper side of leaves in the open sun (about 32°C at time of observation) and were very agile.

Differential diagnosis: This species is very peculiar among all congeners in the structure of the male morphological sternite VII. This species is somewhat similar with *M. coniceps* Pic, 1901 of Aru Islands since several paratypes, especially from Senggo vill. env., have head constricted posterior to eyes. Female genitalia of *M. eparaksts* sp. nov. are identical to those in lectotype and paralectotype of *M. coniceps*. Since male is unknown for *M.*



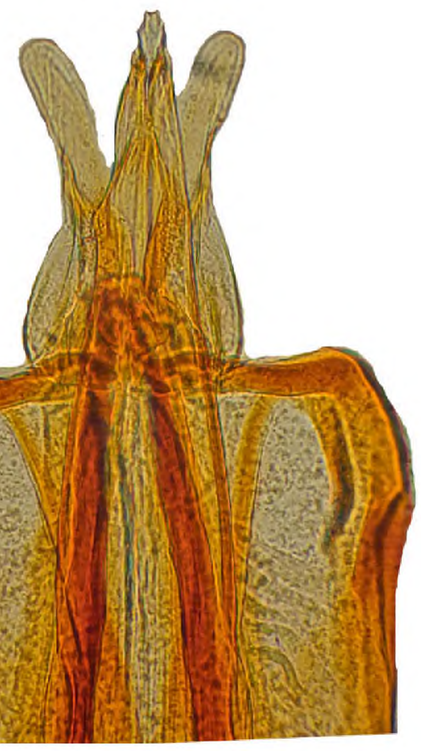
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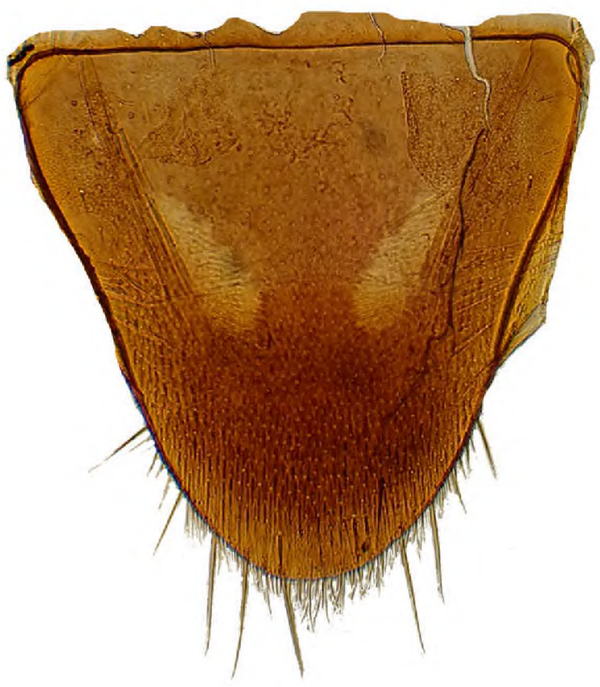
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Figures 16-22. *Macratria eparaksts* sp. nov. 16-20 – Paratype ♂: 16 – Morphological tergite VII; 17 – Morphological sternite VII; 18 – Appendages and apical margin of male sternite VII; 19-20 – Aedeagus; 21-22 Paratype ♀: 21 – Morphological tergite VII; 22 – Morphological sternite VII.









coniceps male genitalia cannot yet be compared. Female pronotum is considerably less slender in female *M. eparaksts* sp. nov. than in *M. coniceps*. Further studies are needed to highlight this possible relationship.

Distribution: Southern (Indonesian) New Guinea lowlands.

***Macratria marind* sp. nov.** (Figs 23-28 & 44-45, plate 99 figs 1-3, map 5: rhomboid)

http://zoobank.org/687FE9E9-EAAD-45A9-80E2-FC9046965CCF

Holotype ♂ NME: INDONESIA E, S New Guinea, Merauke 24,5 km N, Salore vill env., Kumbe left riverbank, 8°16'26"S, 140°22'50"E, 17.IX.2015, 10 m, sago swamp & muddy riverbank, riverside vegetation, leg. D.Telnov.

Paratypes 21♂♀ DTC & 6 NME: same label as in holotype.

Derivatio nominis: Named in honour of the Marind tribe and language of southern New Guinea in the area this species was collected. Noun in apposition, invariable.

Measurements: Holotype male, total body length 3.55 mm, maximum combined width at base of elytra 0.85 mm; head (neck excluded) 0.65 mm long, across eyes 0.6 mm broad, pronotum 0.8 mm long, maximum width 0.6 mm, elytra 2.1 mm long, across base 0.85 wide. Paratype female: total body length 3.65 mm, maximum combined width across middle of elytra 0.9 mm; head (neck excluded) 0.7 mm long, across eyes 0.65 mm broad, pronotum 0.85 mm long, maximum width 0.6 mm, elytra 2.1 mm long, across base 0.9 mm wide.

Description: Dorsum reddish brown, brown or black-brown, head usually somewhat paler. Mouthparts, palpi, legs and antennae yellow (last with at three-four terminal antennomeres slightly darker). Hind legs completely dark in certain paratypes. Venter uniformly reddish to blackish brown, last visible tergite and sternite slightly paler. Head circular with round, extremely large and strongly prominent rather coarsely faceted eyes occupying almost the whole sides of head. Tempora broadly rounded with a head base, base without median notch. Frons narrow, in male narrower than combined length of two



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Figures 23-26. *Macratria marind* sp. nov., paratype ♂: 23 – Morphological tergite VII; 24 – Morphological sternite VII; 25-26 – Aedeagus.



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Figures 27-28. *Macratria marind* sp. nov., paratype ♀: 27 – Morphological tergite VII; 28 – Morphological sternite VII.

basal antennomeres. Punctures minute and flat, spaceous, intervening spaces larger than punctures. At least one paratypic specimen with head densely and rather coarsely punctured with small intervening spaces. Underside of head much more spaceous punctured, smooth. Pubescence yellowish, fine and dense. Antennae long, reaching over base of elytra. Basal antennomere cylindrical. Third antennomere slightly longer than second antennomere. Antennomeres 3-7 long and slender, hardly thickened distally. 9-10 wider and thickened distally (in females stronger than in males) but hardly shortened. Terminal antennomere elongate, 2x longer than (in males) to equal in length (in females) with 9-10 antennomeres together. Terminal maxillary palpomere cultriform. Pronotum cylindrical, dorsally slightly flattened, without lustre. Punctures coarse and dense, intervening spaces smaller than punctures. Pubescence yellowish, long and dense, appressed. Basal groove without whitish pubescence. Scutellum short and broad, truncate apically. Elytra elongate, without lustre, laterally hardly narrowed toward apices (almost parallel). Punctures on each elytron arranged into 5-6 regular rows (in dorsal view); each of these punctures provided with a long appressed seta. Intervening spaces microreticulate. Pubescence yellowish, long and very dense, appressed and almost completely hiding the dorsal surface of elytra. Hind wings fully developed. Legs long and slender. Protarsi distinctly thickened in both sexes. Basal metatarsomere in both sexes longer than combined length of metatarsomeres 2-4. Last visible ventrites hardly extending beyond elytral apices. Male morphological tergite VII truncate apically (Fig. 23), female - truncate with short angular median projection (Fig. 27). Male morphological sternite VII with two spike-like projections on apical margin, truncate between them (Fig. 24), of female broadly rounded apically (Fig. 28). Aedeagus with midsized, apically rounded and medially pubescent parameres (Figs 25-26).

Sexual dimorphism: Females have shorter terminal antennomere, shorter basal metatarsomere, broader frons (as broad as or broader than combined length of two basal antennomeres) and elytra.

Variability: Total body length up to 4.5 mm in certain paratypes. Some paratypes much darker blackish-brown coloured.

Differential diagnosis: This species appears to most closely resemble *Macratria riparia* Telnov, 2012 (Raja Ampat Islands: Misool) but the last visible male sternite lacks the excavation between the projections (excavated in *M. riparia*), the parameres are curved with apices pointed (parameres not curved, apices rounded in *M. riparia*), the last visible female tergite bears an angulate median projection (rounded in *M. riparia*), the male terminal antennomere is comparatively shorter than that of *M. riparia,* and the colouration is darker in certain specimens.

Ecology: Based on material so far seen, this species exhibits a strong riparian preference. Specimens were collected from green leaves of *Cryptocoryne* sp. growing in profusion on muddy riverbanks of lowland rivers (Figs 44-45). Beetles were stationary or ant-like in movement in sunny weather on leaves of *Cryprocoryne* sp. just near the waterline. When disturbed, they flew actively around the plants, resembling a cloud of mosquitoes, and also moved to the underside of near growing Sago palm (*Metroxylon sagu*) leaves where they remained motionless until the disturbance ceased. This species inhabits the very same habitat and demonstrates very similar behaviour as *Macratria riparia* Telnov, 2012 on Misool Island.









Distribution: Hitherto known from the extreme South of Indonesian New Guinea, Southern lowlands in surroundings of Merauke.

***Macratria obiensis* sp. nov.** (Figs 29-34, plate 99 figs 4-7, map 4: rhomboids)

http://zoobank.org/88A3DA89-F597-46E9-AF32-5976FBA78A3B

Holotype ♂ NME: INDONESIA E, North Moluccas, Obi Islands, Obira Is., S part, Wayaloar vill. W, Wayaloar River, 1°42'42"S, 127°37'01"E, 17.XII.2013, riverine lowland rainforest, leg. L.Wagner.

Paratypes 11 specimens: 5 DTC: same label as in holotype; 3 NME & 3 DTC: INDONESIA E, North Moluccas, Obi Islands, Obira Is., W part, Kawasi vill. 5-6 km SE, North of Akelamo river mouth, 1°35'51"S, 127°25'04"E, 15.XII.2013, gardens, secondary lowland rainforest & swamp, leg. L.Wagner.

This species belongs to the *M. gestroi* species-group (see Telnov 2011a for group definition).

Derivatio nominis: Toponymic. This species is named after its area of origin, the Obi Islands of North Moluccas.

Measurements: Holotype male, total body length 4 mm, maximum combined width at base of elytra 0.9 mm; head 0.7 mm long, across eyes 0.6 mm broad, pronotum 0.9 mm long, maximum width 0.55 mm, elytra 2.3 mm long, across base 0.9 wide. Paratype female: total body length 4.6 mm, maximum combined width at base of elytra 1.0 mm; head 0.8 mm long, across eyes 0.75 mm broad, pronotum 1 mm long, maximum width 0.7 mm, elytra 2.6 mm long, across base 1.05 wide.

Description and differential diagnosis: Externally similar to *Macratria capreolus* Telnov, 2011 (North Moluccas), *Macratria coniceps* Champion, 1916 (Aru Islands), *M. laszlowagneri* Telnov, 2011 (Central Moluccas), *Macratria misoolensis* Telnov, 2011 (Raja Ampat Islands), *Macratria pamelaschmidti* Telnov, 2011 (Solomon Islands), *Macratria pseudodensata* Telnov, 2012 (S New Guinea: Asmat area), and *Macratria subguttata* Pascoe, 1860 (North Moluccas), but differs by the combination of the following characters: apical third of elytra on disc with a poorly defined zone of whitish pubescence surrounded by pale yellow main pubescence, male morphological sternite VII with two robust, densely and long pubescent antlers-like lateral pro-



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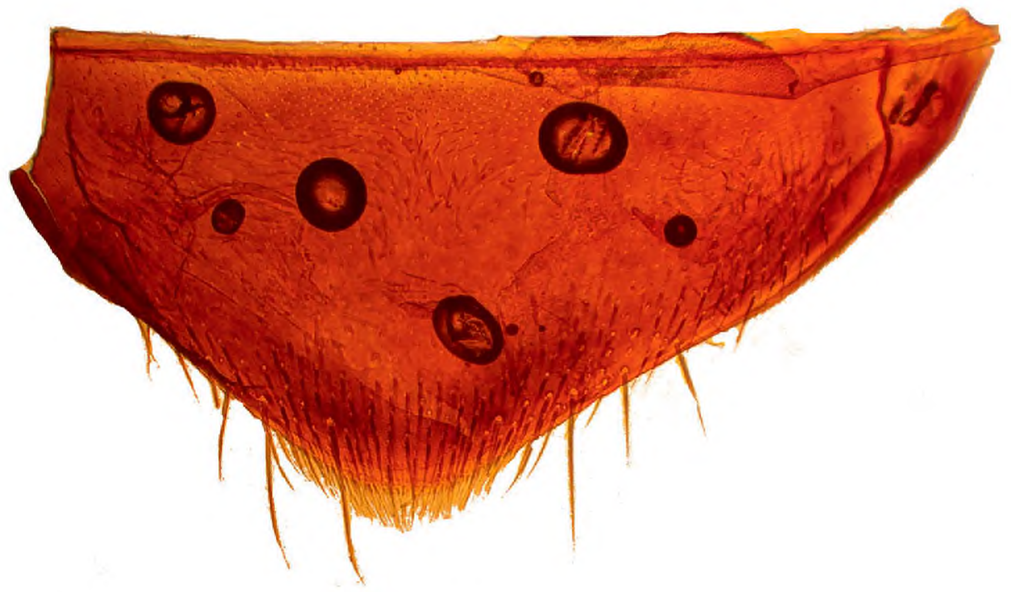
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Figures 29-32. *Macratria obiensis* sp. nov., paratype ♂: 29 – Morphological tergite VII; 30 – Morphological sternites VI-VII; 31-32 – Aedeagus.



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Figures 33-34. *Macratria obiensis* sp. nov., paratype ♀: 33 – Morphological tergite VII; 34 – Morphological sternite VII.

cesses. Apical margin between processes is slightly concave (Fig. 30), male morphological tergite VII triangular and broadly pointed apically, terminal antennomere hardly 2x longer than the penultimate one in both sexes, metatibiae without modifications in both sexes, eyes very large and occupying almost whole tempora in both sexes, head base broadly rounded, aedeagus as in Figs 31-32. Female morphological tergite VII and sternite VII as in Figs 33-34 respectively; sternite with rounded and densely punctured median protruding. Legs generally black brown. Male morphological tergite VII as in Fig. 29.

Sexual dimorphism: Females are generally more robust with a comparatively broader pronotum and elytra.

Ecology: Specimens of this species were sampled during the hot daytime from leaves of low strata vegetation (up to 2 m high) in disturbed lowland rainforests and gardens.

Distribution: Obira Island of Obi group, southernmost North Moluccas.

***Macratria patani* sp. nov.** (Figs 35-39, plate 100 figs 1-2, map 4: filled circle)

http://zoobank.org/939C45B0-32F8-45B7-98FD-23BE9DFC72E3

Holotype ♂ NME: INDONESIA E, North Moluccas, Halmahera SE, Patani W, between the jetty & Patani, 0°18'10"N, 128°39'38"E, 15-50 m, secondary lowland rainforest, 10.VII.2013, leg. D.Telnov.

Paratypes 5♂ DTC: same label as in holotype.

Derivatio nominis: Named after Patani, the local language of the SE arm of Halmahera where this species was sampled. Noun in apposition, invariable.

Measurements: Holotype male, total body length 4.55 mm, maximum combined width across base of elytra 1 mm; head 0.85 mm long, across eyes 0.7 mm broad, pronotum 1.15 mm long, maximum width 0.7 mm, elytra 2.45 mm long, across base 1 mm wide.

Description: Head reddish-orange, yellow on mouthparts. Antennae yellow with three terminal antennomeres slightly darker. Pronotum and elytra uniformly dark brown, the first one generally darker. Front legs yellow, profemora with small triangular brown predistal spot and base of protibiae shortly brown, procoxae red. Median legs with dark red coxae, mesofemora broadly yellow medially with basal and distal parts reddish-brown (leaving extreme apices narrowly yellow), mesotibiae pale brown, mesotarsi yellow. Hind legs black brown, base of metafomeora reddish brown and extreme apices narrowly yellowish, basal metatarsomere brown, remaining metatarsomeres yellow. Underside reddish-brown. Head ovoid, opaque or hardly shiny dorsally, with extremely large and strongly prominent eyes covering whole sides of head. Head slightly converging posterior to eyes to narrower and broadly notched base. Frons very narrow, in male strongly narrower than combined length of two basal antennomeres. Punctures rather large and dense, intervening spaces smaller than punctures. Underside of head smooth and shiny, minutely punctured. Pubescence yellowish, sparse, appressed. Antennae slender but rather short, in male hardly reaching base of pronotum. Basal antennomere cylindrical. Third antennomere longer than second antennomere. Antennomeres 3-8 very elongate and slender, hardly thickened distally. Antennomeres 9-10 stouter but hardly longer than antennomeres 3-8. Terminal antennomere in male elongate, twice longer than the penultimate antennomere. Terminal maxillary palpomere axeform. Pronotum cylindrical, flattened and opaque dorsally. Punctures large, dense and coarse, intervening spaces microreticu-









late, much smaller than punctures. Pubescence greyish, long and dense, appressed. Basal groove without dense whitish pubescence. Scutellum small, truncate apically. Elytra opaque to hardly shiny dorsally, laterally almost parallel. Dorsal surface delicate punctate, punctures are larger and deeper in basal half but getting very delicate and flat in apical half. Pubescence greyish to yellowish, rather long and dense, appressed. Somewhat longer and appressed setae are arranged in 6-7 rows on each elytron. Hind wings fully developed. Legs stout, tibiae densely setose. Protibiae rather short and stout. Pro- and mesotarsi distinctly thickened in male. Spurs of metatibiae long and stout. Male basal metatarsomere longer than combined length of metatarsomeres 2-4. Apices of last visible ventrites hardly extending beyond elytral apices. Male morphological tergite VII broadly excavated medioapically (Fig. 35). Male morphological sternite VII short and broad, broadly rounded apically (Fig. 36). Aedeagus with long and thin parameres (Figs 37-39).

Sexual dimorphism: The female is unknown.

Ecology: Sampled from low strata vegetation in secondary lowland rainforest.

Differential diagnosis: This species is peculiar among all Moluccan congeners due to its colouration (thus *Macratria* are known as rather variable in body colouration) and structure of male genital organs and last ventrites. Several allopatric congeners have an apically excavated male morphological tergite VII and some of these species also have a red-coloured head and pale appendages. These species differ from *M. patani* in the following characters: *Macratria fruhstorferi* Pic, 1942 (Sulawesi) has the parameres provided with a preapical denticle (parameres not denticulate in *M. patani*), *M. fulvipes fulvipes* Pascoe, 1860 (Sulawesi) has curved parameres (parameres straight in *M. patani*) and male morphological tergite VII is vaguely excavated apically (tergite VII is strongly excavated in *M. patani*), *M. grisescens* Telnov, 2011 (Sula Islands, North Moluccas) has distally broad parameres (parameres not or hardly widened distally in *M. patani*) and the male morphological tergite VII is vaguely excavated apically, *M. maxbarclayi* Telnov, 2011 (Sulawesi) has the male terminal antennomere more than twice as long as the penultimate one (about twice so long in *M. patani*) and the pronotum is less coarsely punctured (pronotum coarsely punctured in *M. patani*), *M. obscuripes* Pic, 1912 (Sulawesi) has the pronotal punctures large but flat, less coarse and the male morphological tergite VII is vaguely excavated apically, *M. sanguiceps* Telnov, 2011 (Sulawesi) has the head base truncate (head base rounded and notched apically in *M. patani*) and the male terminal antennomere is longer than antennomeres 9-10 combined (male



35

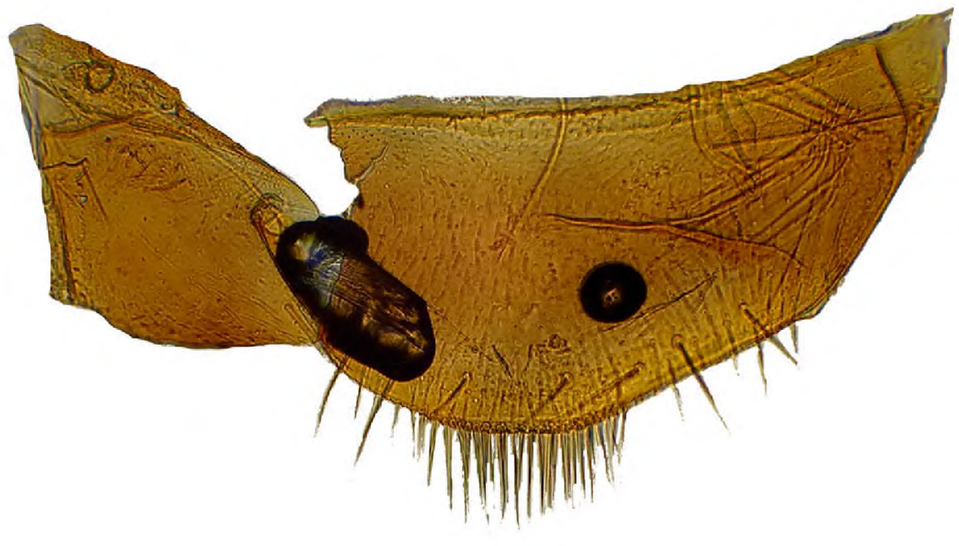




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Figures 35-39. *Macratria patani* sp. nov., paratype ♂: 35 – Morphological tergite VII; 36 – Morphological sternites VI-VII; 37-39 – Aedeagus.

terminal antennomere maximum as long as antennomeres 9 & 10 in *M. patani*), *M. sulaensis* Telnov, 2011 (Sula Islands, North Moluccas) is generally paler brown, has the male morphological sternite VII obtuse and with a short, median protrusion (male morphological sternite VII different in *M. patani*) and the male morphological tergite VII is vaguely excavated apically, *M. testaceicornis* Pic, 1901 (Sulawesi) has generally dark coloured legs (front and median legs distinctly bicoloured in *M. patani*), has fore-body finely punctured and shiny (punctures coarser on fore-body in *M. patani*) and has a transverse band of white setae in the basal third of elytra (no such band in *M. patani* sp. nov.).
Distribution: SE arm of Halmahera Island, North Moluccas.

***Macratria sahu* sp. nov.** (Figs 40-43, plate 100 figs 3-4, map 4: empty circle)
http://zoobank.org/749D7770-C08A-4028-8BCF-F4D8051B847D
Holotype ♂ NME: INDONESIA E, North Moluccas, Halmahera NW, River Alce Diri near Jailolo, 01°06'28"N, 127°28'49"E, 15-17 m, 16.VII.2013, lowland river, leg. L.Wagner.
Paratype 5♂ DTC & 2♂ NME: same label as in holotype.

This species belongs to the *M. gestroi* species-group (see Telnov 2011a for group definition).
Derivatio nominis: This species is named after Sahu, a local tribe and language in surroundings of Jailolo, NW Halmahera. Noun in apposition, invariable.
Measurements: Holotype male, total body length 4.8 mm, maximum combined width across base of elytra 1.05 mm; head 0.9 mm long, across eyes 0.75 mm broad, pronotum 1.1 mm long, maximum width 0.7 mm, elytra 2.6 mm long, across base 1.05 mm wide.
Description and differential diagnosis: Dorsal body black with black-brown legs (tibiae paler yellow-brown), yellow mouthparts (terminal maxillary palpomere brown and antennomeres 1-8 yellow, 9-11 brown. Underside black-brown. Elytra in basal third with transverse band of white hairs (broadly interrupted on suture, not reaching lateral margins of elytra) and with elongate poorly defined preapical spot of white hairs on each elytron.



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Figures 40-43. *Macratria sahu* sp. nov., paratype ♂: 40 – Morphological tergite VII; 41 – Morphological sternite VII; 42-43 – Aedeagus.

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This species is very similar to other species of *gestroi* group but is specifically different in male metatibiae being simple (without modifications and / or long setation) and male morphological sternite VII being rather flat medio-apically between the processes (Fig. 41). Male morphological tergite VII as in Fig. 40. Male aedeagus as in Figs 42-43. Male terminal antennomere elongate, as long as combined length of 9-10 antennomeres.

Sexual dimorphism: The female is unknown.

Ecology: Specimens were collected from riverside vegetation.

Distribution: North-Western Halmahera, North Moluccas.

Macratria sp.

Material 2♀ DTC: INDONESIA, Papua, Korowai area, Yaniruma env., 5°24‘53“S, 139°49’01”E, 25.VI.2016, muddy riverside, on *Metroxylon sagu*, leg. L.Wagner.

Note: This is obviously another yet undescribed species that appears to be morphologically closely related to *Macratria brazzaensis* Telnov, 2012 (Southern New Guinea lowlands). Since only female specimens are currently available, this species is not yet being described.

Distribution: Southern New Guinea lowlands.

Notes on biogeography of *Macratria* Newman, 1838 in the Papuan Region and Wallacea

Macratria is worldwide in distribution with over 300 described species (Telnov 2011a, 2012). New Guinea and adjacent insular systems is perhaps the most complex region in the world with regard to an extremely complex and not well understood geological history (Gressitt 1984; Polhemus 2007). Also the biogeography of the Papuan Region is very complex and its biota is partly derived from different large adjacent Australian and Oriental biogeographic realms. The complex geological history of the area resulted in a wide spectrum of available geological structures (e.g. montane ranges, peninsulas, islands and insular groups) and habitats with different grades of isolation, inhabited by high numbers of endemics of various taxonomic ranks (e.g. species / genus / tribe). The combination of these aforementioned factors makes the Papuan Region extremely attractive for evolutionary and biogeography-related kind of research.

Several authors analyzed the distribution of vertebrates, particularly birds (Beehler 2007) and freshwater fishes (Polhemus & Allen 2007) of New Guinea, defining areas of endemism for terrestrial and freshwater vertebrates. But for most insect groups this vast area remains insufficiently studied and their distribution patterns are poorly understood with some exceptions (for example, Tmesisternini (Coleoptera: Cerambycidae) - Gressitt 1984, freshwater invertebrates - Polhemus & Allen 2007, cicadas - Duffels & de Boer 2007). Generally, identified areas of invertebrate endemism correlate well with such areas defined for vertebrates. Since all of the Papuan Anthicidae were systematically revised by Telnov (2007a & b, 2009, 2011a & b, 2012, 2014) this group considered one of best studied among Papuan insects.

Peculiarities in distribution and endemism patterns of *Macratria* are of particular interest primarily because of vast recent material available for the study. The present list of the Papuan and Wallacean *Macratria* (120 species and subspecies; Telnov 2012) is herewith supplemented with 8 more species. Among the vpresently known 128 *Macratria* species, 126 are considered endemic to the Indo-Australian transition zone. Data on species richness and regional endemism of *Macratria* in the Indo-Australian transition zone (inclusive Papuan Region and Wallacea) were recently summarized and assessed by Telnov (2011a) and soon supplemented by Telnov (2012). The recent discoveries presented in this paper slightly change this pattern (Table 1).

Throughout most lowland areas *Macratria* are known as good and active flyers and inhabit riparian ecosystems with good distribution potential among water courses. For example, 10 *Macratria* species now recorded from North Moluccas of which *M. capreolus* Telnov, 2011 known to inhabit the whole archipelago with minor exceptions (Map 2) and *M. subguttata* Pascoe, 1860 known from most of the area except for Obi Islands (Map 3). On the other hand, some other species seem limited in distribution and localized in certain geographical parts of the archipelago, like *M. obiensis* sp. nov. in Obi Islands and *M. berdnikovi* sp.nov. and *M. patani* sp. nov. in the SE arm of Halmahera.

The vast Southern lowlands of New Guinea are inhabited by several species with large distribution areas. For example, *M. grekei* Telnov, 2011 and *M. ronaldi* Telnov, 2011 are hypothetically distributed all over southern lowlands with some gaps reflecting present level of knowledge and available material (consider maps 1-5). Bird’s Neck with its dramatic anticlines and therefore very different habitats is a (hypothetical) western distribution boundary for these lowlands species.





But even in very similar lowland microhabitats in different parts of the region different species may occur. Telnov (2012) reported *M. riparia* Telnov, 2012 from lowlands of Misool and Waigeo islands, Raja Ampat. On Misool this species is found in mass on leaves of *Cryptocoryne ciliata* growing in mud directly on waterline and in low water of lowland rivers. In southern New Guinea, surroundings of Merauke, another species *M. marind* sp. nov. has been found in the very same habitat on leaves of *Cryptocoryne* sp. (see description of this species and ecological notes above).

On the other hand, montane areas are inhabited by low mobility species (based on field observations, see behaviour notes for *M. hatamensis* Telnov, 2011) and *M. rotundiceps* Telnov, 2011 with rather limited distributions (Map 1) and (theoretically) low dispersal ability.

The following provisional Anthicidae areas of endemism are herewith proposed in the Papuan Region and Wallacea based on available information:

1. Sulawesi;
2. North Moluccas;
3. Doberai, Bomberai and Onin peninsulas except montane areas of the Arfak and Tamarau;
4. Arfak Mountains and Tamarau Mountains of Doberai Peninsula;
5. South New Guinea from Bird's Neck Isthmus in the West towards the Papuan Peninsula in the East;
6. Central Cordillera of New Guinea;
7. Solomon Islands.

Therefore New Guinea is subdivided into at least four main areas of endemism with other areas represented by large islands (Sulawesi) or insular groups (North Moluccas, Solomon Islands). Insufficient data are available in order to define Central Moluccas, North New Guinea and Bismarck Archipelago as an Anthicidae endemism area.

Table 1. Species richness and endemism of *Macratria* Newman in the Papuan Region and Wallacea.

Island group or region	**Island**	**Species richness**	**Proportion of endemic species**
Aru Islands	no data	1	100% endemic
	Wokam	1	100% endemic
Lesser Sunda Islands	Lombok	1	0% endemic
	Sumbawa	1	100% endemic
Lesser Sunda (region)		2	50% endemic
Moluccan Islands (excl. Aru)	Bacan	3	0% endemic
	Buru	1	0% endemic
	Halmahera	8	60% endemic
	Morotai	1	0% endemic
	Obi	2	50% endemic
	Seram & Lease Islands	1	0% endemic
	Ternate	1	0% endemic
	Tidore	1	0% endemic
North Moluccas (region)		10	100% endemic
Central Moluccas (region)		1	100% endemic
New Guinea & Cenderawasih Bay Islands		89	99% endemic
	Papua New Guinea	40	98% endemic
	Indonesian Papua (excl. Cenderawasih Bay Islands)	47	99% endemic
	Biak & Numfoor	1	100% endemic
	Yapen	4	75% endemic
Sula Islands	Mangole	2	100% endemic
Sulawesi	Sulawesi, Buton & Peleng	15	87% endemic
Sulawesi (region North)		9	89% endemic
Sulawesi (region Central)		5	80% endemic
Sulawesi (region South)		4	75% endemic
Sulawesi (without precise data)		1	100% endemic
Raja Ampat Islands	Misool	3	100% endemic
	Salawati	1	0% endemic
	Waigeo	4	25% endemic
Raja Ampat (region)		6	67% endemic
Solomon Islands	Guadalcanal & Tulaghi	4	75% endemic
	Malaita	1	0% endemic
	New Georgia	1	0% endemic
	Makira (= San Cristobal) & Uki	1	0% endemic
	Santa Isabel	1	0% endemic
Solomon Islands (region)		5	100% endemic






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I am grateful to Dr. Daniel K. Young (University of Wisconsin, Madison, U.S.A.) for English proof reading and general comments on the manuscript.

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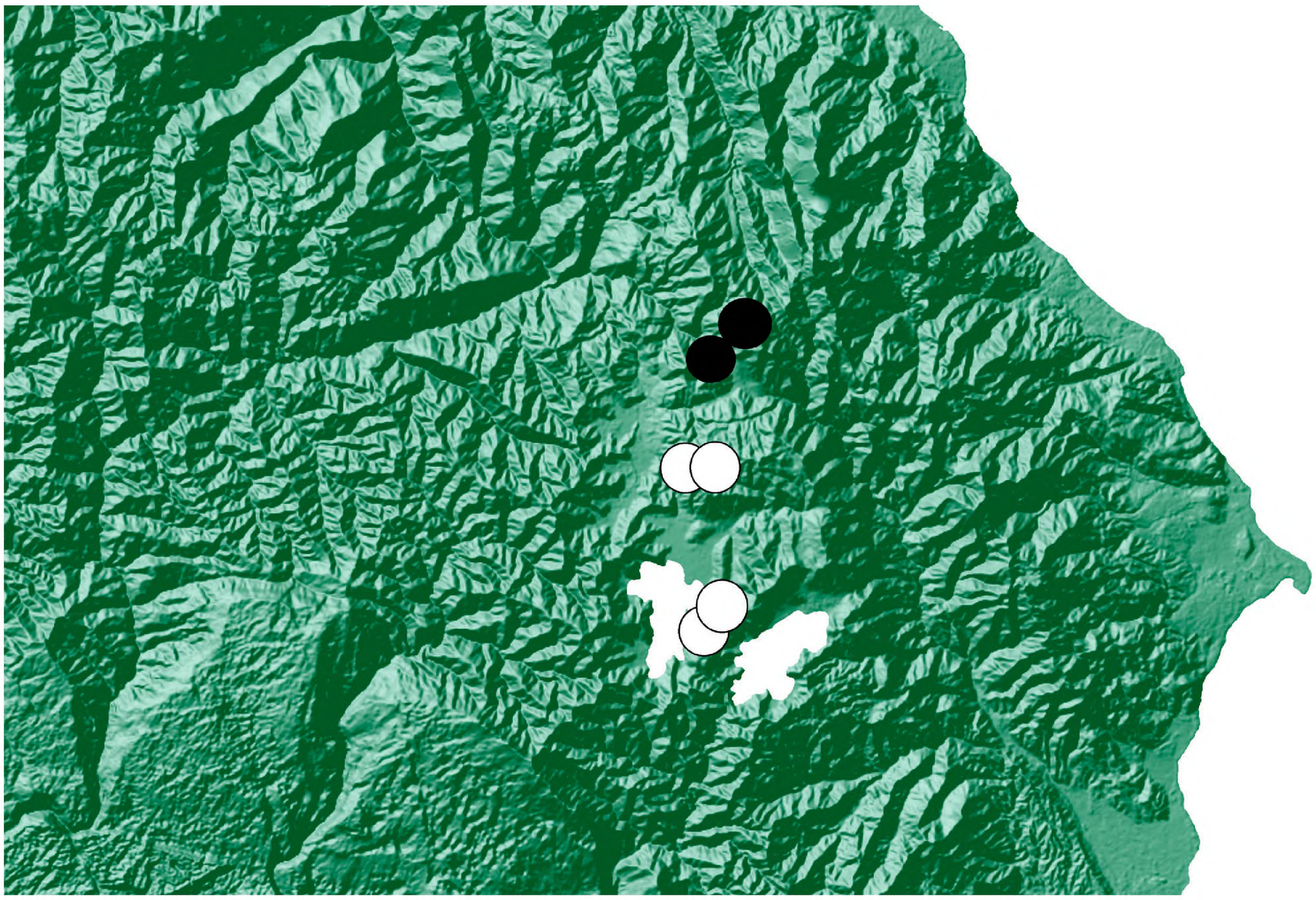
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Received: 10.01.2017.





Map 1. Distribution of *Macratria hatamensis* Telnov, 2011 (empty circles) and *M. rotundiceps* Telnov, 2011 (filled circles) in Arfak Mountains, Doberai Peninsula of New Guinea (Anggi Lakes are white on the map).





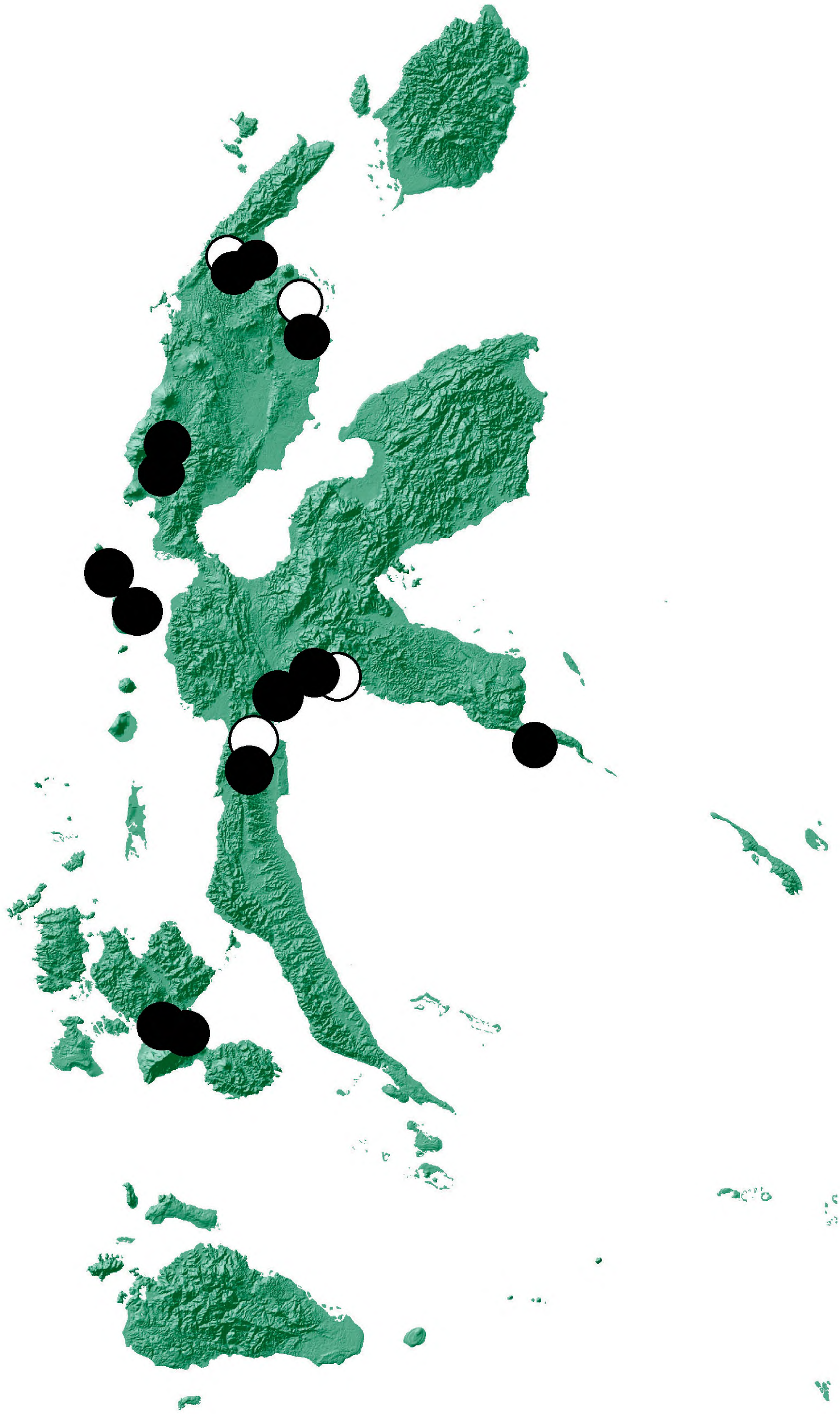






Map 2. North Moluccas: distribution of *Macratria capreolus T*elnov, 2011.





Map 3. North Moluccas: distribution of *Macratria pygmaea halmaherica* Telnov, 2011 (empty circles) and *M. subguttata* Pascoe, 1860 (filled circles).








Map 4. North Moluccas: distribution of *Macratria sahu* sp. nov. (empty circle), *M. berdnikovi* sp. nov. and *M. patani* sp. nov. (filled circle), and *M. obiensis* sp. nov. (rhomboids).





Map 5. New Guinea: distribution of *Macratria ronaldi* Telnov, 2011 (empty circles), *M. grekei* Telnov, 2011 (filled circles), and *M. marind* sp. nov. (rhomboid).



Map 6. New Guinea: distribution of *Macratria citak* sp. nov. (empty circle), *M. eparaksts* sp. nov. (filled circles), and *M. ayamaru* sp. nov. (rhomboid).










Figures 44-45. Habitat of *Macratria marind* sp. nov. 44 – River Kumbe at locus typicus, southern New Guinea, Merauke surroundings (consider muddy banks and Sago Palm stands); 45 – *Cryptocoryne* sp. plants on which *M. marind* sp. nov. specimens were observed in large number (photos: D. Telnov).





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Figures 46-47. Habitat of *Macratria hatamensis* Telnov, 2011 in Arfak Mountains. 56 – Moist mossy mid-montane rainforest around Uper village, ~2000 m (consider low strata vegetation from which specimens were sampled); 47 – Open and semidry forest remnants on watershed between Gigi and Gita lakes (Anggi Lakes), ~2250 m (photos: D. Telnov).











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Figures 48-49. Habitat of *Macratria* species. 48 – *Saccharum* sp. stands along River Kokopola in NE Halmahera - habitat of *M. capreolus* Telnov, 2011, *M. pygmaea halmaherica* Telnov, 2011, and *M. subguttata* Pascoe, 1860; 49 – Microhabitat (young tree) of *M. rotundiceps* Telnov, 2011 in Arfak Mountains, moist mossy mid-montane rainforest (photos: D. Telnov).





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Figures 50-52. Habitat of *Macratria* species. 50 – Taro plant from which *M. subguttata* Pascoe, 1860 specimens were sampled in NE Halmahera, near Lake Makete; 51 – Roadside semidry vegetation from which *M. pygmaea halmaherica* Telnov, 2011 and *M. subguttata* were sampled in Central Halmahera; 52 – Taro plant in Sabale caldera (Tidore Island) from which *M. subguttata* specimens were sampled (photos: D. Telnov).









Insular odonates in Melanesia: a new species of damselfly from Manus Island, Papua New Guinea (Zygoptera: Platystictidae) and comments on *Nososticta manuscola* Theischinger et Richards

GÜNTHER THEISCHINGER [1], **STEPHEN J. RICHARDS** [2]

1 – Office of Environment and Heritage New South Wales, Sydney, NSW, Australia *and* Australian Museum, Entomology, 6 College Street, NSW 2010, Sydney, Australia; e-mail: gunther.theischinger@environment.nsw.gov.au
2 – *Corresponding author*: Herpetology Department, South Australian Museum, North Terrace, S. A. 5000, Adelaide, Australia; e-mail: steve.richards@samuseum.sa.gov.au *and* Wildlife Conservation Society, Goroka, Papua New Guinea

Abstract: A new species of damselfly, *Drepanosticta gazelle* sp. nov., is described from Manus Island, Papua New Guinea. The new species is most similar to *D. antilope* Theischinger et Richards, 2005, another insular species known only from New Britain Island to the south-east of Manus. The female of *Nososticta manuscola* Theischinger et Richards, 2015, a species previously known from a single male, is described for the first time and data on variation in male morphology are provided.

Key words: Damselfly, Zygoptera, Admiralty Archipelago, *Drepanosticta, Nososticta*, variation, new species.

Introduction

The odonate fauna of Manus Island in Papua New Guinea's remote Admiralty Archipelago remains poorly known. Richards et al. (2015) reported 20 species from Manus, most of which also occur on mainland New Guinea or on other Pacific islands (Michalski 2012; Kalkman & Orr 2013; Orr & Kalkman 2015). Exceptions are an endemic damselfly, *Nososticta manuscola* Theischinger et Richards, 2015 described from Manus Island on the basis of a single male specimen and a photograph of a female, and an undescribed platystictid damselfly of the genus *Drepanosticta* Laidlaw, 1917 that is currently known only from the vicinity of Mt Sabomu on Manus Island's south coast (Richards et al. 2015).

Here we provide additional data on the poorly-known endemic damselfly *N. manuscola*, including the first comprehensive description of the female and information on morphological variation in males. We also formally describe the previously unnamed *Drepanosticta* species. It is likely that additional field work in this remote island archipelago will reveal more odonate novelties.

Materials and methods

Descriptive terminology largely follows Watson & O'Farrell (1991). Colouration is given as detectable from the preserved material, supplemented with photographs of specimens taken in life. Measurements are given in millimeters (mm). All illustrations were done with the aid of a camera lucida and are not to scale. Coordinates are presented using the GPS datum WGS 84. Material is lodged in the collection of the South Australian Museum in Adelaide, Australia (SAMA).

Taxonomic part

***Drepanosticta gazelle* sp. nov.** (Figs 1-6, plates 101 fig. 1, 102 fig. 1)

Holotype ♂ SAMA 07-001460: Papua New Guinea, Manus Island, Mt Sabomu, within 250 m of: 2.193°S, 146.967°E; 456 m a.s.l., 04 October 2014, S.J. Richards.

Paratypes 4 specimens (all from Papua New Guinea, Manus Island): 1♂ & 1♀ SAMA 07-001461-62: same data as holotype; 1♂ SAMA 07-001463: Piri Village,






2.211°S, 146.965°E; 40 m a.s.l., 03 October 2014; 1♂ SAMA 07-001463: same locality but 06 October 2014; all leg. S.J. Richards.

Derivatio nominis: The specific name 'gazelle' refers to the antler-shaped processes on the posterior lobe of the male and female pronotum; it is used as a noun in apposition to the generic name and also alludes to the probable close relationship of the new species to *Drepanosticta antilope* Theischinger et Richards, 2005.

Diagnosis: A small slender species, distinguished from all congeners by a combination of the following characters: largely black with limited pale greyish yellow markings (Plate 101 fig 1, plate 102 fig. 1); poststernum very pale, the posterior lobe of pronotum in both sexes elaborate; transverse occipital carina developed into a point on each side; male superior anal appendages shorter than inferiors and having both a dorsal and an inner medial tooth.

Description of holotype (male): Head – Largely blackish brown to black with most of labrum, all of mandible base and adjacent portion of genae and anteclypeus, more than anterior half of postclypeus, part of antennal scape and all of pedicel whitish yellow; labium pale brown and approximately anterior third of labrum dark brown. Prothorax (Figs 1-2) – Notum largely yellowish to brownish grey, narrowly black along the black pleura; posterior lobe markedly raised posteriorly, with pair of plump antler-like processes. Legs pale greyish to brownish yellow with knees, apex of tibiae and terminal tarsal segments slightly darkened. Synthorax – Mesopleura largely bronze-black without distinct antehumeral markings; metapleura greyish to brownish yellow merging into broad greyish brown patch along both sides of metapleural suture; metapostepimeron pale greyish yellow with dorsal edge black. Postcoxae and poststernum very pale greyish yellow. Legs much as in prothorax. Wings – Membrane hyaline, very slightly suffused with pale yellowish to greyish brown. Venation blackish brown to black. Pterostigma brownish grey, almost twice as long as wide, generally overlying slightly more than one cell, proximally very slightly convex, distally rather strongly so; postnodals 18/18. Abdomen – Largely bronze-brown to bronze-black; only posterior dorsal edge of S1, posterior portion of S7, bases of S3-8 and ventral edges of S8 and S9 greyish yellow to brownish grey but the dark and pale areas merging into each other and thus not well defined. S10 and long narrow hooked inferior anal appendages greyish yellow to brownish grey, superior anal appendages slim, pale greyish yellow, undulate in lateral view, with well-defined medial tooth close before mid-length and dorsal tooth not much beyond (Figs 3-4). Measurements (mm) – Hw 21.0, abdomen (including anal appendages) 33.2.

Description of female: Head much as in male. Prothorax coloured much as in male; processes of posterior lobe with stem markedly more slender, but apex almost as large as in male (Figs 5-6). Synthorax much as in male. Legs similar to male but femora slightly darker and tibiae and tarsi more uniformly greyish brown. Wings similar to male; postnodals 16-17/17. Abdomen much as in male but pale and dark areas even less distinct and less strongly defined. Ovipositor black and brownish yellow; anal appendages pale brownish yellow. Measurements – Hw 19.5, abdomen 26.5.

Variability: The male paratypes agree well with the holotype in structure and coloration but are somewhat smaller. Their postnodals numbers are 16-20/15-17, their measurements 18.3-19.1 mm (Hw) and 27.8-29.5 mm (abdomen plus anal appendages). Both males from Piri Village are smaller than the three males from the type locality, and they have fewer postnodals.

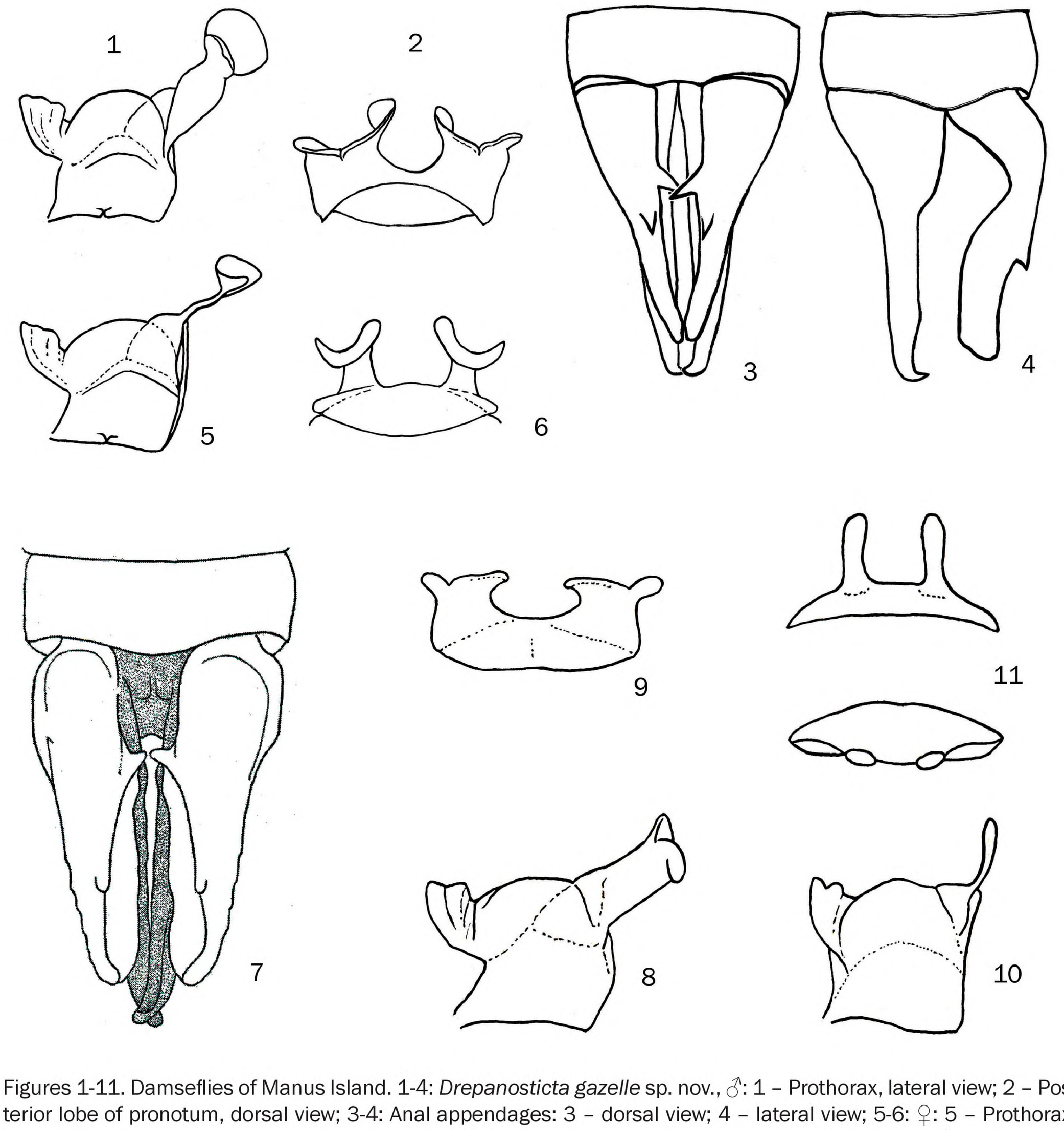
Differential diagnosis: The description of *Drepanosticta gazelle* sp. nov. brings to three the number of Papuan species of *Drepanosticta* Laidlaw that share a transverse occipital carina developed into a point on each side, lack of pale antehumeral markings and male superior anal appendages that are shorter than the slender hooked inferiors and have both a dorsal and a medial tooth. The others are *D. antilope* Theischinger et Richards, 2005 from New Britain and *D. exoleta* Lieftinck, 1932 from northern Papua New Guinea (Michalski 2012; Kalkman & Orr 2013), and these three species are presumably closely related. The male of *Drepanosticta gazelle* can be distinguished from *D. exoleta* by having the two teeth on the male superior anal appendages close together (vs widely separated in *D. exoleta*; Fig. 7). The pronotal processes of male *D. gazelle* (Figs 1-2) are apically more strongly developed than in *D. antilope* (Figs 8-9), and the anal appendages (Figs 5, 6) are more slender. The female of *D. gazelle* has the pronotal processes (Figs 5-6) similarly elaborate as the male, whereas they are simple elongate lobes in *D. antilope* (Figs 10-11). Both sexes of *D. gazelle* differ from *D. antilope* by the very pale vs very dark poststernum.

Habitat: *Drepanosticta gazelle* sp. nov. was found along several streams draining Mt Sabomu on the south coast of Manus Island, between about 40 m a.s.l. near the coast at Piri Village and 456 m a.s.l. just below the mountain's summit (Plate 103 fig.

1). Despite intensive searches, it was not found at any lowland sites with lower-gradient streams (Richards et al. 2015) and this species may be restricted to high-gradient forest streams on Manus Island. Like other members of the genus on mainland New Guinea it is a secretive species, perching motionless for long periods in densely vegetated shady areas adjacent to clear forest streams. It was also found at low densities in shady areas along streams traversing the disturbed forest and gardens around Piri Village.

Variation in *Nososticta manuscola* Theischinger et Richards, 2015 (Figs 12-15)

Material studied: Papua New Guinea, Manus Island: 1♂ SAMA 07-001465: Mt Sabomu, 2.193°S, 146.967°E; 456 m a.s.l.; 03 October 2014; 6♂ & 1♀ SAMA 07-001466-70, 07-001486-87: same locality but 04 October 2014; 1♂ SAMA 07-001488: Piri Village,



Figures 1-11. Damseflies of Manus Island. 1-4: *Drepanosticta gazelle* sp. nov., ♂: 1 – Prothorax, lateral view; 2 – Posterior lobe of pronotum, dorsal view; 3-4: Anal appendages: 3 – dorsal view; 4 – lateral view; 5-6: ♀: 5 – Prothorax, lateral view; 6 – Posterior lobe of pronotum, dorsal view; 7 – *Drepanosticta exoleta* Lieftinck, 1932, ♂ anal appendages, dorsal view (modified from Lieftinck (1932)); 8-11: *Drepanosticta antilope* Theischinger et Richards, 2005 (modified from Theischinger & Richards (2005)): 8-9 – ♂: 8 – Prothorax, lateral view; 9 – Posterior lobe of pronotum, dorsal view; 10-11 – ♀: 10 – Prothorax, lateral view; 11 – Posterior lobe of pronotum, frontal and dorsal view.

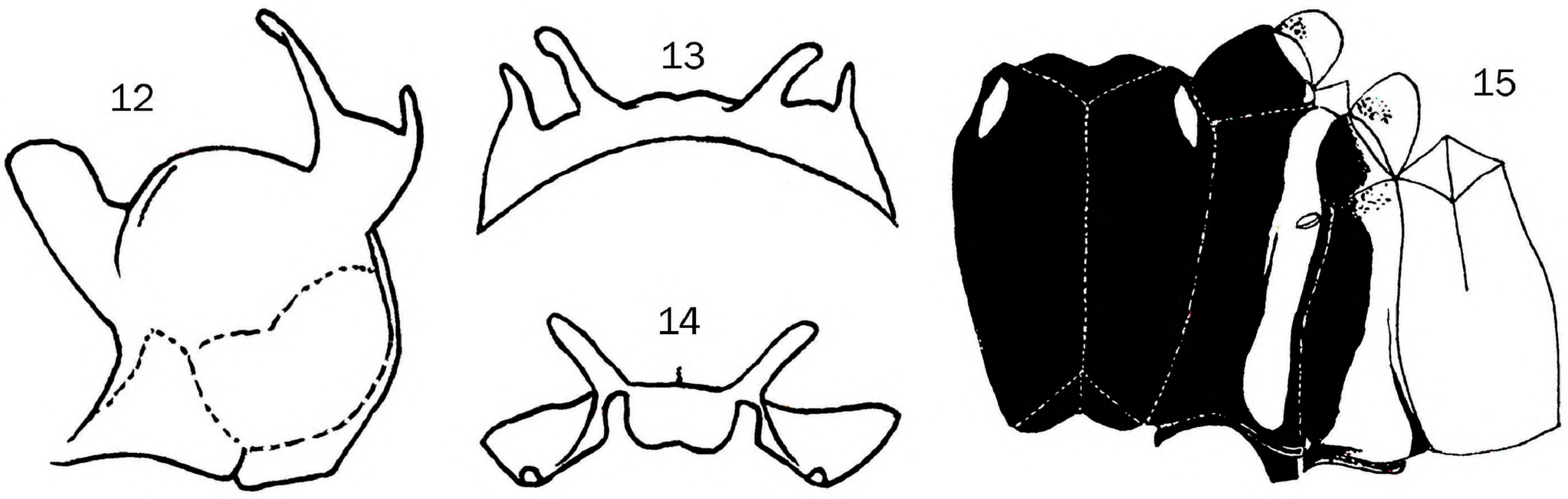


2.211°S, 146.965°E; 40 m a.s.l.; 03 October 2014; 1♂ SAMA 07-001489: same locality but 06 October 2014; all leg. S.J. Richards.

This new material allows us to complement the description provided by Theischinger & Richards (2015) of the male based only on the holotype (and then only known) specimen and to present the first detailed description of the female.

Male variation: The original description of male colouration in life was based on a photograph of a rather young individual (photo 10 in Theischinger & Richards (2015)). Collection of additional, mature male specimens has revealed some differences in colouration (Plate 102 fig. 2) and these are described here along with variation in wing venation and body measurements. In more mature males the pale markings on head, thorax and abdomen including the anal appendages do not appear bluish, as originally described, but rather uniformly whitish to very pale greenish or brownish yellow. The lateral spot on tergum 1 is hardly noticeable, and only the extreme edge of tergum 9 shows some pale colour. The wing membrane of most specimens is slightly suffused with pale greenish brown, and there are 15-16/11-15 postnodals. The transverse crossvein descending from the distal margin of the discoidal cell is missing in only one of 36 wings; CuP reaches wing margin between 1/3 and 4/5 length of first cell following discoidal cell. The hindwing length ranges from 17.6-19.6 mm, the abdomen (+ anal appendages) length from 29.4-34 mm.

Description of the female: (Figs 12-15, plate 102 fig. 3) Head – Largely black; only approximately basal half of labium whitish grey, and a rather wide bar from eye to eye across anterior frons and genae adjacent to postclypeus pale brownish yellow. Thorax – Pronotum (Fig. 12) black, median lobe slightly raised into a well-rounded bump each side, posterior lobe (Figs 13-14) with two sets of slender lateral lobes, the inner longer than the outer, and with slightly bilobed median plate; propleura largely pale brownish yellow. Synthoracic pleura largely black with the following areas pale brownish yellow (Fig. 15): tiny, suboval mesepisternal patch, hardly longer than 1/6 of anepisternum; mesepimeral/metepisternal patch, roughly parallel sided, covering only tiny parts of posterior edge of mesepimeron but full length and width of metepisternum; metepimeral patch as long as metepimeron; posteroventral corner of katepisterna, more extensive in metakatepisternum; narrow ventral section of metapostepimeron. Postcoxae dull greyish yellow, poststernum very pale yellow. Coxae and trochanters pale brownish yellow, meso- and metacoxa anteriorly with small dark basal patch; femora with upper face and apical section black, otherwise brownish to greyish yellow; tibiae with inner face and apically black, otherwise largely pale brownish yellow; tarsi black; claws brown; overall the forelegs are darkest, the hindlegs palest. Wings – Venation black; membrane hyaline; pterostigma brownish- to blackish grey, slightly widening distally, approximately twice as long as wide and overlying 1 cell; 14/12 postnodals; a transverse crossvein descending from distal margin of discoidal cell to wing margin; CuP reaching wing margin approximately 1/2 length of first cell following discoidal cell. Abdomen – Terga 1 and 2 dorsally black, laterally pale to somewhat darker brownish yellow; terga 3–9 dorsally broadly black, latero-ventrally pale brownish yellow, only tergum 3 with indication of small pale basal spot each side; segment 10 largely black, merging into yellowish brown only ventrally. Sterna largely blackish brown, merging into brownish yellow apically. Ovipositor reaching slightly more than length of S10 beyond S10; terebra brown; valves pale brownish yellow. Anal ap-



Figures 12-15. *Nososticta manuscola* Theischinger, Richards, 2015 ♀: 12 – Prothorax, lateral view; 13-14: Posterior lobe of pronotum: 13 – frontal view; 14 – dorsal view; 15 – Synthorax, frontal, lateral, ventral view.

pendages black. Measurements [mm] – Hindwing 19.3-19.5; abdomen 30.5-30.9.

Habitat: On Manus Island *N. manuscola* reaches high densities along clear streams in forest, and on Mt Sabomu it occurred in sympatry with *Drepanosticta gazelle* sp. nov., described above. It also persists in disturbed habitats, including forest and garden regrowth in the vicinity of streams. The species appears to be endemic to Manus Island, although its occurrence on other islands in the archipelago cannot be discounted. It was not encountered on Mussau Island to the north-east of Manus during a survey there in 2014 (Richards et al. 2015) and it has not been reported from northern mainland New Guinea or the Bismarck Archipelago (e.g. Gassmann 2015). Despite its limited known distribution, the ability of *N. manuscola* to persist in degraded habitats suggests that the future of this endemic species is probably secure.

Discussion: *Nososticta manuscola* is the only member of this speciose and widespread Australopapuan genus known from the Admiralty Archipelago. In the original description (Theischinger & Richards 2015), *N. manuscola* was considered to be most similar to *N. marina* (Ris, 1913), a species from southern mainland and insular New Guinea. Examination of the additional material reported here confirms the distinctiveness of these two species. In particular the presence of a transverse crossvein descending from the distal margin of the discoidal cell in the wings of *N. manuscola* clearly distinguishes this species from *N. marina* (which lacks this crossvein). There also appear to be consistent differences in size and shape of the antehumeral patch. In male *N. manuscola* it is shaped like a 'tear-drop' (Plate 102 fig. 2) and extends just 1/3 of the length of the mesanepisternum, which is markedly shorter than in *N. marina* where the narrowly oval-shaped patch extends from slightly less than, to slightly more than, ½ the length of the mesanepisternum (e.g. photo 8 in Theischinger & Richards 2016).

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Flower flies (Diptera: Syrphidae) of Philippines, Solomon Islands, Wallacea and New Guinea

F. CHRISTIAN THOMPSON [1], XIMO MENGUAL [2], ANDREW D. YOUNG [3], JEFFREY H. SKEVINGTON [3]

1 – Department of Entomology, National Museum of Natural History, Smithsonian Institution, Washington, D.C., U.S.A.; e-mail: xelaalex@comcast.net
2 – Zoologisches Forschungsmuseum Alexander Koenig, Leibniz-Institut für Biodiversität der Tiere, Adenauerallee 160, D–53113, Bonn, Germany; e-mail: x.mengual@leibniz-zfmk.de
3 – Canadian National Collection of Insects, Arachnids and Nematodes, Agriculture and Agri-Food Canada, K.W. Neatby Building, 960 Carling Avenue, Ottawa, ON K1A 0C6, Canada *and* Department of Biology, Carleton University, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada; e-mails: adyoung@gmail.com (corresponding author), jhskevington@gmail.com

Abstract: The flower flies of the Philippines, Solomon Islands, Wallacea and New Guinea are reviewed. An overview of the family is given followed by a key to the genera with a synopsis of each genus. Two new combinations are made: *Matsumyia cyaniventris* (Sack, 1926) comb. nov. (formerly *Criorhina cyaniventris*) and *Citrogramma calceata* (Sack, 1926) comb. nov. (formerly *Xanthogramma calceata*).

Key words: Diptera, Brachycera, Syrphidae, Philippines, Wallacea, New Guinea, Solomon Islands, identification key, Indomalayan (Oriental) Region.

Introduction

Flower flies are an abundant and critical component of terrestrial ecosystems. They are found from northernmost Greenland to the subantarctic islands (South Georgia), with the greatest species richness in the Neotropics. As their common name indicates, adults are flowers visitors. The immature feeding modes range from predaceous (feeding on sternorrhynchous bugs), to wood borers, to aquatic filter-feeders and to specialized inquilines in social hymenopteran colonies. These flies are favourites among amateurs, especially in Europe.

Acronyms used in the text:

ls. – Island or islands;
PSWNG – Phillippines, Solomon Islands, Wallacea, and New Guinea.

Diagnosis

Small to large flies (body length 4-25 mm). Fully winged; usually with holoptic males (Fig. 5, plate 169 fig. 3, plate 169 fig. 7); females (Fig. 5, plate 170 fig. 7, plate 171 fig. 1) and some males (Plate 169 fig. 5) dichoptic; three ocelli present; antenna short to elongate, with distinct scape, pedicel, basoflagellomere, and apical style (Plate 167 fig. 1) or dorsal to subbasal arista (Fig. 3, plate 167 figs 3-7); without head bristles, rarely with bristles on thorax (*Cheilosia*, *Graptomyza*, *Ornidia* and *Volucella*); plumula (fringed posteroventral extension of subalar sclerite) short to long, rarely absent. Wing with large basal cells r, bm, and cu*p*; with closed apical cell (cell r_{4+5}) (Figs 7-8, plate 172 figs 1-10); spurious vein usually present between radial and medial fields (absent in *Graptomyza*, *Psilota*, and *Syritta flaviventris* in the PSWNG area) (Plate 172 figs 7, 9); calypter usually well developed. Abdomen slender or petiolate (Plate 169 fig. 1) to elongate (Plate 169 fig. 5) or oval (Plate 170 figs 1, 3).

Third instar larvae (Figs 20-23) and puparia are easily recognized by the following combination of characters: anal segment bearing single, sclerotized breathing tube; anus on anteroventral margin of anal segment, not separated from it by transverse integumental fold; dorsum of prothorax with





longitudinal folds (inconspicuous in microdontines and some syrphines).

Four basic forms of larvae exist: (1) Microdontinae: mandibles at apex of head skeleton, bladelike with serrated ventral margins. Larva hemispheric, with distinct lateral fringe (Fig. 20). Mesothorax, prothorax, and mouthparts concealed in ventral pocket of metathorax, which consequently forms anterior margin of larva. Anal segment and posterior respiratory process short. (2) Syrphinae and Pipizinae: apex of head skeleton consists of elongated, thin, and tapered labrum and labium forming black sclerotized upper and lower rods; mandibles thin and stylet-like and appear on each side of these rods. Anal segment and posterior respiratory process short. (3) Rhingiini and Merodontini: mandibles also at apex of head skeleton but hook-like in form and projecting from mouth. Anal segment and posterior respiratory process usually short. (4) Eristalinae, exclusive of Rhingiini and Merodontini: mandibles reduced and inconspicuous. With specialized pouch-like structure, formed from mandibles and their lobes. Anal segment usually elongate, extended, and partially retractile (Figs 22-23). Prolegs with crochets (Fig. 22), except in most eumerines and cheilosines and lacking in syrphines, pipizines and microdontines.

Syrphid flies are easily recognized by a combination of large basal cells (cells r, bm, and cu*p*) with a closed apical cell (cell r_{4+5}) (Figs 7-8, plate 172 figs 1-10). A long spurious vein between the radial and medial sectors is a useful diagnostic character, but is not found in all species, and shorter spurious veins are found in some Conopidae.

Biology

Most syrphid flies visit flowers, and many are pollinators, although the microdontines (Cheng & Thompson 2008) are only found in association with ant colonies. Males hover or rest near flowers and/or breeding sites awaiting females. Syrphid larvae have a wide range of niches. Saprophages occur in all types of wet environments, from tree sap to bromeliads, decaying plant parts, and specialized niches such as the refuse dumps of *Atta* leaf-cutter ants. Predatory species also vary in the niches occupied. Some live concealed in ant nests, attacking the early stages of ants or other myrmecophiles. Many syrphines live on plants, attacking colonial insects such as sternorrhynchous Hemiptera. Given this diversity, we have included in the synopsis below more specific information on the biology of each group.

Because of the diverse life histories of flower flies, they are of great importance. Adult flies are beneficial pollinators (Ssymank & Kearns 2009; Ssymank et al. 2009; Inouye et al. 2015), some being used for greenhouse pollination of flowers and seed-producing plants (Jarlan et al. 1997; Rader et al. 2016). A number of the predaceous species are valuable biological control agents of plant pests on agricultural crops (Tenhumberg & Poehling, 1995; Bergh & Short 2008; Nelson et al. 2012), and phytophagous species (*Cheilosia*) have been used for weed control (Grosskopf 2005). Some of the saprophagous species (*Palpada*, *Ornidia*) have been used to recycle wastes from coffee and orange juice production. In Europe, syrphids are used as ecological indicators to assess environmental quality (Sommaggio, 1999; Sommaggio & Burgio 2014). A few species (*Eumerus* and *Merodon*) are pests of ornamental flowers (Ben-Yakir et al. 1997; Tompsett 2002; Alford 2012), and occasionally some eristaline species cause accidental myiasis (Aguilera et al. 1999; Ferrer Bradley et al. 2010).

Phylogenetic relationships

The monophyletic order Diptera is divided in a series of groups but monophyly has only been supported for a few of these groups, e.g. Cyclorrhapha (Griffiths 1972; Stoffolano et al. 1988; McAlpine 1989; Cumming et al. 1995; Melzer et al. 1995; Wiegmann et al. 2003, 2011; Lambkin et al. 2013). Cyclorrhapha was previously divided into Schizophora and Aschiza, the latter now believed to be a paraphyletic grouping of families including Pipunculidae and Syrphidae (Collins & Wiegmann 2002; Moulton & Wiegmann 2004, 2007; Wiegmann et al. 2011; Young et al. 2016). Syrphidae has long been considered to be the sister group to Pipunculidae, forming the superfamily Syrphoidea (e.g. Brauer 1883; Hennig 1948; Griffiths 1972; McAlpine 1989; Cumming et al. 1995; Skevington & Yeates 2000; Rotheray & Gilbert 2008), and both were suggested to be the sister group of Schizophora. But recent morphological (Tachi 2014) and molecular analyses (Collins & Wiegmann 2002; Moulton & Wiegmann 2004; Wiegmann et al. 2011; Young et al. 2016) resolve Pipunculidae as the sister group of Schizophora, depicting Syrphoidea as paraphyletic.

The family Syrphidae has traditionally been divided into three subfamilies: Microdontinae, Eristalinae and Syrphinae (Vockeroth & Thompson






1987). Nevertheless, the pipizines, a tribe of historically uncertain placement (Vujić et al. 2013), has recently been elevated to subfamilial level (Mengual et al. 2015). Current tribal classification, with 15 recognized tribes, has not been generally accepted or fully supported by molecular characters (Mengual et al. 2008, 2015; Young et al. 2016).

Microdontinae is resolved as sister to the rest of the family in most phylogenetic analyses (Thompson 1969; Skevington & Yeates 2000; Ståhls et al. 2003; Rotheray & Gilbert 2008; Mengual et al. 2015; Young et al. 2016), and the tribe Spheginobacchini is placed as the sister group of the remaining microdontines (Ståhls et al. 2003; Hippa & Ståhls 2005; Reemer & Ståhls 2013b; Mengual et al. 2015).

In recent molecular and morphological analyses, the pipizines are resolved as sister to the other syrphines (Ståhls et al. 2003; Rotheray & Gilbert 2008; Mengual et al. 2015; Young et al. 2016). This phylogenetic placement suggests a common predatory ancestor for Pipizinae and Syrphinae, with the particular larval feeding mode on soft-bodied hemipteran and other arthropods evolving only once in the evolution of the Syrphidae. Current tribes within Syrphinae receive no support from combined molecular and morphological data (Mengual et al. 2008, 2015).

The subfamily Eristalinae has been recovered as para- or polyphyletic in most recent analyses (Rotheray & Gilbert 1999; Skevington & Yeates 2000; Ståhls et al. 2003; Hippa & Ståhls 2005; Mengual et al. 2015; Young et al. 2016). However, the relationships among the eristaline tribes have never been studied in detail for the entire group (Thompson 1972a, 1975; Rotheray & Gilbert 1999; Mengual et al. 2015), and more effort with a broader taxon sampling is needed to infer the relationships among them.

Classification

While some authors (Thompson 1969, 1972a; Speight 1987) have split off the basal clade of Syrphidae, recognizing two separate families (Microdontidae and Syrphidae), the monophyletic status and contents of the Syrphidae *sensu lato* have remained unchanged since the group was first recognized by Latreille (1802).

There are 202 genera and 96 non-typic subgenera of Syrphidae currently recognized in the world, 77 of which occur in the PSWNG subregion. The current tribal division of the family is based mostly on adult morphological characters and larval biology (Vockeroth 1969, 1992; Thompson 1972a; Thompson & Rotheray 1998). However, character evidence from the immature stages supports a slightly different view (Rotheray & Gilbert 1999; Katzourakis et al. 2001), and new data from molecular sequences when used in a total evidence analysis strongly suggest that neither immature nor adult characters provide a complete picture of the relationships among the genera of flower flies (Ståhls et al. 2003; Mengual et al. 2015; Young et al. 2016). Fifteen tribes are recognized: Microdontini and Spheginobacchini, in Microdontinae; Brachyopini, Callicerini, Cerioidini, Eristalini, Merodontini, Milesiini, Rhingiini, Sericomyiini, and Volucellini, in Eristalinae; and Bacchini, Paragini, Syrphini and Toxomerini, in Syrphinae. The subfamily Pipizinae has no tribal subdivision. Three clades (subfamilies Microdontinae, Pipizinae and Syrphinae) are supported as monophyletic based on current evidence, but the Eristalinae is not. Until further evidence is available to test this hypothesis, we will continue to follow a four subfamilies classification while recognizing that the Eristalinae is likely either poly- or paraphyletic.

Fossils

No fossils of flower flies are known from the Wallacea-New Guinea area. Fossils are known from Florissant shales (Eocene / Oligocene) in North America, Baltic amber, French and German deposits (Eocene / Oligocene / Miocene) and Sarmatian limestones in Croatia (Miocene) in Europe; and Dominican amber (Oligocene/Miocene) in the West Indies (Hull 1945, 1960; Evenhuis 1994).

Identification

No key to the genera for the Indomalayan [Oriental] or Australian Regions as a whole exist, but a couple of older works exist for subregions. Walker (1861, 1865) catalogued and described Diptera from New Guinea. Osten Sacken (1882) described Diptera from the Philippines. Edwards & Austen (1915) further described Diptera from Dutch [Papua] New Guinea. Brunetti (1923) revised the flower flies of British India. Sack (1926) described Syrphidae from the Philippines and Malaysia. In a series of studies, Curran (1928, 1931a, 1931b) revised the syrphid fauna of Malaysia, and Guadalcanal (Curran 1947). Ferguson (1926a, 1926b)






and Hardy (1933, Syrphinae) revised the Australian fauna. Keiser (1952) described some Syrphidae from Sumba, Sumbawa, Flores, and Timor. Shiraki (1963) revised the flower flies of Micronesia, and previously the fauna of Taiwan (Shiraki 1930). Doesburg (1966) described Syrphidae from New Guinea and Australia. More recently, Ohara & Kusigemati (1985) described several species of Syrphidae from Solomon Islands and New Guinea and Mengual & Thompson (2010) provide a species list of Syrphidae found in Papua, Indonesia.

General information on syrphid larvae can be found in Rotheray (1993) and references therein. No treatments of immatures for the Indomalayan or Australian regions exist. Only the treatments of the immatures of the Nearctic (Heiss 1938; Johanssen 1935) and European (Rotheray 1993; Rotheray & Gilbert 1999) regions exist.

Identification key to Philippine, Solomon Islands, Wallacea and New Guinea flower fly groups

The following key and generic annotations include all species known from the Philippines, Solomon Islands, Wallacea and New Guinea (see Map 1). For basic morphological terminology please refer to Figs 1-10.

1 Postmetacoxal bridge narrow but complete, face convex to straight in profile, never with long frontal prominence. Anterior anepisternum pilose. Antenna usually elongate, with scape and usually also basoflagellomere more than 2.5 times as long as wide (Plate 167 fig. 2). Eye bare [Microdontinae] 9
– Postmetacoxal bridge usually absent or incomplete, but if present then broad and face either concave, tuberculate, or with long frontal prominence. Anterior anepisternum pilose or bare. Antenna usually short; scape usually at most twice as long as wide; basoflagellomere usually rounded or oval. Eye bare or pilose 2
2 Postpronotum bare (see fig. 9). Head posteriorly strongly convex and closely appressed to thorax so that postpronota are partly or entirely hidden. Male abdomen with tergum 5 visible in dorsal view and varying in form of a subquadrate or subtriangular to short transverse sclerite (Plate 169 figs 1, 3, 5) [Syrphinae] 19
– Postpronotum pilose (see fig. 9). Head posteriorly less strongly convex so that postpronota are clearly exposed. Male abdomen with tergum 5 not visible in dorsal view (Plate 169 fig. 7, plate 170 figs 1, 3, 5, 7, plate 171 figs 1, 3, 5, 7) 3
3 Antenna with terminal stylus (Plate 167 fig. 1) [Cerioidini] 76
– Antenna with dorsal arista, with arista basal or subbasal, never at apex (Plate 167 figs 3-10) 4
4 Vein R_{4+5} moderately to strongly sinuate (Plate 172 figs 1, 4) 50
– Vein R_{4+5} straight or nearly so, not sinuate (Plate 172 figs 5, 7-10) 5
5. Arista plumose or pectinate, with pile at least 3 times as long as basal diameter of arista (Plate 167 fig. 7) [Volucellini] 48
– Arista bare or pubescent, with pile never more than twice as long as basal diameter of arista (Plate 167 fig. 9) 6
6. Vein M_1 recessive anteriorly and with external appendices; cell r_{2+3} open at wing margin (Plate 172 fig. 5). Arista bare. Anepisternum with anterior flattened portion pilose ..... *Eumerus*
– Vein M_1 usually processive anteriorly. If slightly recessive, then never with external appendices. Anepisternum usually bare anteriorly 7
7 Eye bare 78
– Eye pilose 8
8 Oral margin evenly rounded, not notched anteromedially; facial groove reduced to a pit (Plate 167 fig. 12). Abdominal terga 2 and 3 large; tergum 4 very short, less than 1/4 as long as tergum 3. Subscutellar fringe present (as in fig. 17) [Pipizinae] ..... *Triglyphus*
– Oral margin notched anteromedially; facial groove elongate, not forming a small round pit (Plate 167 fig. 11). Abdomen not as such. Subscutellar fringe present or absent 74
9 Vein R_{4+5} with an appendix extending posteriorly into cell r_{4+5} (Plate 172 fig. 3) 11
– Vein R_{4+5} without such an appendix 10
10 Transverse suture incomplete medially; anepisternum pilose only on anterodorsal corner and narrowly along posterior edge; metasternum usually pilose (as in fig. 16) ..... *Paramicrodon*
–Transverse suture distinct, continuous across scutum; anepisternum uniformly pilose, without bare medial area; metasternum bare ..... *Indascia*
11 Postpronotum bare 18
– Postpronotum pilose 12
12 Basoflagellomere greatly elongated, four or more times longer than scape, narrow, six or more times longer than broad. Scutellum unarmed. Abdomen elongate, widest apically; with only 3 segments visible dorsally; tergum 4 hidden dorsally by shield–like sides of tergum 3, vertical, and appearing as hypopygium; hypopygium concealed, only visible ventrally ..... *Kryptopyga*
– Basoflagellomere shorter, less than four times as long as scape 13
13 Vein M_1 (apical crossvein) strongly recurrent on anterior 1/3, usually with an appendix (Plate 172 fig. 3). Second abdominal segment with anterior margin rectangular; abdomen broadly triangular, broadest at base .... *Chymophila*
– Vein M_1 straight or rounded, not angulate, without an appendix. Second abdominal segment usually without rectangular anterior margin 14
14 Antenna quite short, shorter than distance between antennal fossa and anterior oral margin .....






..... *Archimicrodon*
– Antenna longer, scape and basoflagellomere several to many times longer than pedicel 15
15 Tergum 2 with a pair of depressed areas. Pro– and mesofemora with basoanterior patches of dense short spinose pile ..... *Parocyptamus*
– Tergum 2 without depressed areas. Femora without such patches of pile 16
16 Anepisternum extensively bare ventrally and medially, with bare part reaching dorsad to above half the height of the anepisternum ..... *Microdon*
– Anepisternum with bare part limited to ventral half of the anepisternum, or entirely pilose 17
17 Tergum 1 well–developed, especially on disc where it is frequently 1/2 as long as tergum 2 and always extends beyond scutellum; semicircular in shape with hind margin very rounded. Eye short pilose or bare .....
..... *Heliodon*
– Tergum 1 greatly reduced, frequently almost linear on disc and practically covered by scutellum. Eye bare .....
..... *Metadon*
18 Abdomen oval. Basoflagellomere 6 times as long as pedicel ..... *Bardistopus*
– Abdomen petiolate; tergum 2 flattened, sometimes constricted or with large basolateral pale macula; terga 3 and 4 (males) or 5 (females) forming a club. Basoflagellomere 3 to 5 times as long scape .....
..... *Paramixogaster*
19 Anterior anepisternum bare 23
– Anterior anepisternum pilose at least posterodorsally 20
20 Posterior wing margin without sclerotized black maculae. Abdomen petiolate ..... *Petioleomyia*
– Wing with a series of minute closely spaced black maculae on posterior margin (fig. 19). Abdomen petiolate, parallel-sided or oval 21
21 Metasternum pilose ..... *Episyrphus*
– Metasternum bare 22
22 Abdomen oval to parallel–sided, never petiolate; tergum 2 always less than twice as long as its apical width. Metaepisternum bare; anterior anepisternum generally pilose ..... *Meliscaeva*
– Abdomen petiolate; tergum 2 more than 6 times as long as its apical width (Plate 169 figs 1-2); Metaepisternum pilose ventrad to spiracle; anterior anepisternum with a single row or patch of pile posterodorsally .....
..... *Asiobaccha*
23 Costa with strong black swelling at extreme base; alula narrow (Plate 172 fig. 6). Face produced strongly anteriorly. Metasternum bare. Male broadly dichoptic (Plate 169 figs 5-6) ..... *Giluwea*
– Costa simple basally, without such black swelling. Face variable. Metasternum pilose or bare. Male holoptic or dichoptic 24
24 Abdomen parallel–sided to oval, never distinctly petiolate 26
– Abdomen elongate, strongly petiolate; tergum 2 narrower than tergum 3 25
25 Postmetacoxal bridge usually incomplete. Postpronotum and/or anterior anepisternum pilose; laterotergite dorsally with a patch of long pile ..... *Allobaccha*, in part
– Postmetacoxal bridge complete. Postpronotum, anterior anepisternum, and laterotergite all bare .... *Baccha*
26 Face and scutellum entirely black in background colour. Abdomen without marginal sulcus. Metasternum bare (fig. 15). Eye bare 45
– Face or scutellum or both, at least partly yellow or yellowish brown in background colour, both never entirely black. Abdomen, metasternum, and eye variable 27
27 Tergum 1 greatly reduced, frequently almost linear on disc and practically covered by scutellum, sublaterally at most 1/2 as long as tergum 2; terga not punctate. Eye and metasternum variable. Length 6 mm or more .. 30
– Tergum 1 well-developed, especially on disc where it is frequently 1/2 as long as tergum 2 and always extends well beyond scutellum, sublaterally about 3/4 as long as tergum 2; terga minutely punctate. Eye pilose. Metasternum bare. Length 7.5 mm or less [Paragini] 28
28 Eye uniformly pilose. Scutellum entirely black .....
..... *Pandasyopthalmus*
– Eye with vertical alternate vittae (bands) of pile reflecting light differently (Plate 167 fig. 8). Scutellum black with apex narrowly yellow or reddish 29
29 Scutellum with conspicuous teeth on posterior margin. Eye in dorsolateral view with two dark and three more distinct white pile vittae ..... *Serratoparagus*
– Scutellum with apical margin simple, without teeth. Eye with two white pile vittae among dark pile ... *Paragus*
30 Metathoracic pleuron with a tuft of fine hairs ventrad to spiracle; metasternum pilose. Vein R_{4+5} distinctly sinuate. Large species with broad flattened abdomens with distinct marginal sulcus ..... *Asarkina*
– Metathoracic pleuron bare ventrad to spiracle; metasternum variable. Vein R_{4+5} straight or sinuate. Size and abdominal shape variable 31
31 Scutum with at most a poorly defined dull yellow pollinose lateral vitta; ground colour black 38
– Scutum with a sharply–defined, contrasting shiny yellow or whitish yellow lateral or sublateral vitta extending at least from postpronotum to transverse scutal suture; ground colour yellow 32
32 Abdomen without marginal sulcus 35
– Abdomen with at least a weak marginal sulcus on terga 4 and 5, often with a strong sulcus on terga 3-5 ... 33
33 Basoflagellomere elongate, from 1.6 to 2.0 times as long as broad. Male metatrochanter with ventral calcar. Wing extensively bare, bare on basal 2/3 and only sparsely microtrichose on apical 1/3. Eye bare .....
..... *Ischiodon*
– Basoflagellomere oval, at most 1.3 times as long as broad. Male metatrochanter simple. Wing extensively microtrichose, with moderate bare areas on basal 1/3, densely microtrichose on apical 1/3. Eye bare or pilose
..... 34
34 Subscutellar pile fringe absent. Lateral mesonotal yellow vitta does not reach yellow of scutellum; scutellum always black basally. Metasternum bare .....
..... *Xanthogramma*






– Subscutellar pile fringe present. Lateral mesonotal yellow vitta reaches yellow of scutellum; scutellum yellow, with or without medial black macula. Metasternum usually pilose ..... *Citrogramma*, in part
35 Metasternum pilose 37
– Metasternum bare 36
36 Vein M_1 (apical crossvein) perpendicular to R_{4+5}, nearly straight, widely divergent from wing margin. Scutellum subtriangular. Abdomen without marginal sulcus. Male narrowly dichoptic ..... *Eosphaerophoria*
– Vein M_1 progressive, oblique, slightly sinuous, parallel with wing margin or nearly so. Scutellum rounded. Abdomen with weak marginal sulcus on tergum 5. Male holoptic ..... *Citrogramma*, in part
37 Subscutellar pile fringe complete, well–developed, moderately dense. Male terminalia small, inconspicuous; tergum 9 at most 1/3 as wide as abdomen .....
..... *Allograpta*
– Subscutellar fringe absent or nearly so on at least median 1/3, present but sparse laterally. Male terminalia extremely large, globose; tergum 9 as wide as abdomen
..... *Sphaerophoria*
38 Wing with distinct transverse brown vitta at mid length extending from costa to posterior margin, about 1/3 of wing width (Plate 172 fig. 10); sparsely haired flies with *Syrphus*–like abdominal pattern of broad transverse yellow fasciae ..... *Dideopsis*
– Wing without transverse dark vitta, unmarked except for stigmal darkening or rarely with costal area longitudinally darkened and with dark anteroapical macula 39
39 Metasternum pilose 44
– Metasternum bare 40
40 Abdomen with weak but distinct marginal sulcus, oval 42
– Abdomen without sulcus, slender and parallel–sided or narrowly oval 41
41 Metacoxa with tuft of pile at posteromedial apical angle. Face not produced or prominent below. Male holoptic ..... *Melangyna*
– Metacoxa without posteromedial apical pile tuft. Face moderately produced anteriorly. Male dichoptic .....
..... *Melanosyrphus*, in part
(pale areas on face are easily missed in some specimens)
42 Katepisternum pile patches distinctly separately posteriorly (as in fig. 13). Abdomen with pale yellow or grayish maculae, always very densely pollinose. Face densely grayish pollinose. Eye densely and uniformly pilose ...
..... *Betasyrphus*
– Katepisternum pile patches narrowly to broadly joined posteriorly (fig. 11). Abdomen with bright yellow maculae, at most very slightly pollinose. If face densely pollinose, then eye distinctly pilose only on dorsal half ... 43
43 Eye densely pilose throughout or nearly so .....
..... *Dasysyrphus*
– Eye with dense pile only on dorsal half, nearly bare ventrally ..... *Epistrophe*
44 Metacoxa without a tuft of pile posterolaterally. Katepisternum with dorsal and ventral pile patches very nearly confluent anteriorly, distinctly separated posteriorly ..... *Macrosyrphus*
– Metacoxa with a tuft of pile posterolaterally. Katepisternum with pile patches broadly separated anteriorly, narrowly joined posteriorly (Plate 169 fig. 3-4) .....
..... *Dideoides*
45 Metaepisternum with several fine subappressed hairs; katepisternum with pile patches broadly separated posteriorly, joined anteriorly. Metacoxa with tuft of pile at posteromedial apical angle ..... *Xanthandrus*
– Metaepisternum bare; katepisternal pile patches broadly separated throughout. Metacoxa without posteromedial apical pile tuft 46
46 Metasternum greatly reduced, with deep posterior incision laterally so that sclerotized portion consists of a median diamond–shaped area with a narrow anterior and lateral strips (fig. 14). Face not produced below, with small tubercle. Male legs slender, without bristles, pile tufts or modified hairs ..... *Melanostoma*
– Metasternum entire (fig. 15). Face moderately produced anteriorly, with distinct tubercle 47
47 Male holoptic, with proleg modified, either broadened, or with special bristles, pile tufts or modified hairs. Face not greatly produced anteroventrally (Indomalayan) .....
..... *Platycheirus*
– Male dichoptic, with unmodified legs. Face strongly produced anteroventrally (New Guinea) .....
..... *Melanosyrphus*, in part
(pale areas on face are easily missed in some specimens)
48 Cell r_1 open, not petiolate; vein M_1 [apical crossvein] perpendicular or slightly recessive (Plate 172 fig. 7). Katepimeron bare ..... *Graptomyza*, in part
– Cell r_1 petiolate; vein M_1 strongly recessive anteriorly (Plate 172 fig. 8). Katepimeron pilose 49
49 Face with medial and two lateral tubercles. Notopleuron enlarged, produced posteriorly. Anepimeron pilose posteriorly. Shiny metallic green to purple flies .... *Ornidia*
– Face with only a medial tubercle. Notopleuron normal, not produced. Anepimeron bare posteriorly. Non–metallic flies ..... *Volucella*
50 Vein M_1 usually processive anteriorly. If slightly recessive, then arista plumose or cell r_{2+3} petiolate. Anepisternum usually bare anteriorly 52
– Vein M_1 recessive anteriorly; cell r_{2+3} open at wing margin (Plate 172 fig. 5). Arista bare. Anepisternum with anterior flattened portion pilose 51
51 Scutellum broad, short, about four times as broad as long, as wide as head (Plate 170 figs 3-4). Vein M_1 without external appendixes ..... *Azpeytia*
– Scutellum more quadrate, about twice as long as broad, with its width less than that of head. Vein M_1 often with external appendixes ..... *Eumerus*
52 Metathoracic spiracle with a double row of protective pile (an outer and inner row of branched pile closing the spiracle), large, often larger than basoflagellomere. Large robust flies, 15 mm or larger, mimicking wasps and hornets ..... *Milesia*
– Metathoracic spiracle with only a single row of protec-






tive pile, small, smaller than basoflagellomere. Medium sized flies, about 15 mm or smaller 53
53 Cell r_1 petiolate, closed before reaching wing margin 60
– Cell r_1 open at wing margin 54
54 Postalar pile tuft present ..... *Pseuderistalis*, in part
– Postalar pile tuft absent 55
55 Katepimeron pilose. Metabasitarsus with globuliferous hairs basoventrally (Plate 168 fig. 1) .. *Mesembrius*
– Katepimeron bare. Metabasitarsus without such pile 56
56 Face straight, without tubercle. Anepimeron with dorsomedial triangular portion pilose. Pterostigma elongate ..... *Philippinophilus*
– Face tuberculate. Anepimeron with dorsomedial triangular portion bare. Pterostigma short simulating a crossvein 57
57 Metafemur with a large ventrobasal spur and subbasal excavation; metatibia with ventral carina continuing into apical spur (Plate 168 fig. 7) ..... *Tigridemyia*
– Metafemur without spur and excavation; metatibia without apical spur 58
58 Clypeus pilose ..... *Mallota*
– Clypeus bare 59
59 Mesonotum without distinctive pollinose ground pattern ..... *Imatisma*
– Mesonotum with distinctive pattern of pollinose vittae and maculae (Plate 169 figs 7-8) ..... *Austrophilus*
60 Anepimeron with dorsomedial triangular portion bare 64
– Anepimeron with dorsomedial triangular portion pilose 61
61 Postalar pile tuft absent. Eye bare, without maculation. Wing brown, completely microtrichose. Scutellum with marginal sulcus ..... *Solenaspis*
– Postalar pile tuft present. Eye with maculae or vittae. Wing hyaline. Scutellum without marginal sulcus 62
62 Metafemur thickened, distinctly arcuate (Plate 168 fig. 8); metatibia strongly compressed and carinate on basoventral 1/3. Eye bare or very finely pilose dorsally, with pili no longer than ommatidial diameter. Male metatrochanter with ventral patch of short stiff black setulae ..... *Merodonoides*
– Metafemur at most very slightly thickened, not arcuate; metatibia neither carinate nor compressed ventrally. Eye usually densely pilose, with pili much longer than ommatidial diameter. Male metatrochanter simple 63
63 Eye fasciate and punctate ..... *Eristalodes*
– Eye punctate (Fig. 4c) ..... *Lathyrophthalmus*
64 Katepimeron bare 68
– Katepimeron pilose 65
65 Meron bare posteroventrally, without pile anterior or ventrad to metathoracic spiracle. Eye pilose. Arista pilose ..... *Eristalis*
– Meron pilose posteroventrally, with pile anterior or ventrad to spiracle. Eye and arista variable 66
66 Scutellum without apical sulcus. Metatibia at most very slightly compressed apically, with apical half not broader than basal half, without dorsal or ventral pile fringes ..... *Austalis*
– Scutellum with apical sulcus along margin. Metatibia strongly compressed on apical half, distinctly broader than basal half, and often with dense dorsal and ventral fringes of dark hairs 67
67 Metafemur simple ..... *Phytomia*
– Metafemur with apicoventral spur or plate (Plate 168 fig. 3) ..... *Dolichomerus*
68 Postalar pile tuft present 72
– Postalar pile tuft absent 69
69 Face concave, straight or produced anteroventrally, without a tubercle (Plate 167 fig. 4, plate 170 fig. 8) ... 71
– Face with distinct tubercle 70
70 Wing hyaline; basoflagellomere large, much longer than metathoracic spiracle; katepisternum discontinuously pilose, with a few ventral pili, broadly bare medially, pilose on dorsal 1/4; plumula greatly reduced, not branched ..... *Digulia*
– Wing brown on anterior half; basoflagellomere small, only about as long as metathoracic spiracle; katepisternum continuously and densely pilose; plumula well developed, multibranched (Plate 170 fig. 1-2) ..... *Axona*
71 Mesonotum unicolourous; vein R_{4+5} only slightly sinuate; crossvein r-m basal, before middle of discal cell; wing partially bare; male dichoptic; body usually with short thick scale-like pile in addition to long normal pile (Plate 170 figs 7-8, plate 172 fig. 6) ..... *Dissoptera*
– Mesonotum vittate; R_{4+5} strongly sinuate; crossvein r-m apical, beyond middle of discal cell; wing entirely microtrichose; male holoptic; body without specialized pile (Plate 171 figs 1-2) ..... *Keda*
72 Scutellum with a moderately strong to very strong impressed apical margin. Scutellum with well developed ventral pile fringe; bright metallic bluish to purplish flies ..... *Kertesziomyia*
– Scutellum entirely without apical emarginate rim. Scutellar pile fringe variable; usually nor metallic bluish to purplish 73
73 Scutellum densely pilose ventrally on at least basolateral 1/3 or more. Bright coloured flies; face orange; scutellum bright yellow; legs and abdomen extensively orange ..... New Subgenus A
– Scutellum bare ventrally or with at most a very few ventral pili at extreme basolateral angles ..... *Pseuderistalis*, in part
74 Vein M_1 recessive or perpendicular. Scutellum with medial concavity, without a distinct marginal sulcus. Male dichoptic ..... *Graptomyza*, in part
– Vein M_1 processive (Plate 172 fig. 9). Scutellum without medial concavity. Male holoptic 75
75 Face with a distinct medial keel, without a projecting epistoma. Metafemur greatly swollen; metatibia with a anteroventral apical toothed keel (Plate 167 fig. 10, plate 171 figs 5-6) ..... *Nepenthosyrphus*
– Face without a keel, straight, with a projecting epistoma. Metafemur thin, not swollen; metatibia without apical spur ..... *Psilota*
76 Eye pilose. Postmetacoxal bridge complete; abdomen petiolate ..... *Oculovillosa*






– Eye bare. Postmetacoxal bridge incomplete; abdomen variable 77
77 Vein R_{4+5} with an appendix into cell r_{4+5} (Plate 172 fig. 2). Abdomen not petiolate ..... *Ceriana*
– Vein R_{4+5} without appendix. Abdomen petiolate ..... *Monoceromyia*
78 Face produced into a long ventral snout (Plate 167 fig. 6). Costal vein continues around apical apex. Femora simple, without spines. Anterior anepisternum bare; metasternum pilose ..... *Rhingia*
– Face not produced into a long snout. Costal vein ends at wing apex. Femora variable 79
79 Pro- and mesofemora with distinct ventroapical spines (Plate 168 fig. 6). Vein R_{4+5} with last section much less than half as long as crossvein h or absent; cell r_{4+5} closed at wing margin, not petiolate. Small flies, 10 mm or less ..... *Myolepta*
– Pro- and mesofemora without distinct ventral spines (as in Plate 168 fig. 5); if metafemur with ventral spines, then vein R_{4+5} with last section longer than crossvein h and usually longer than crossvein r-m. Anterior anepisternum usually bare; if pilose, then larger flies, 16 mm or greater [see *Milesia*], or flies with metafemur greatly enlarged and with an anteroventral spinose ridge ... 80
80 Metasternum bare 85
– Metasternum pilose, with hairs as long as or longer than those of metacoxa 81
81 Metatrochanter with a large quadrate ventral calcar. Metafemur swollen, with large subapical ventral spur and apicoventral spinose ridge; metatibia with anteroapical spur ..... *Calcaretropidia*
– Metatrochanter simple. Metafemur variable, but not as above 82
82 Wing almost bare on basal 2/3, very sparsely microtrichose on apical 1/3. Metaepisternum with a patch of fine pile; metafemur greatly enlarged, with an anteroventral spinose ridge on apical 1/3 (Plate 168 fig. 4) ..... *Syritta*
– Wing entirely microtrichose or with just moderate bare areas on basal 1/3 or slightly more, densely and uniformly microtrichose on apical 1/3. Metaepisternum pilose or bare; metafemur variable, without apical spinose ridge 83
83 Face produced anteriorly and ventrally, distinctly concave ventrad to antenna, usually tuberculate; gena broad. Larger flies, 15 mm or more in length (Plate 167 fig. 5, plate 171 figs 3-4) ..... *Matsumyia*
– Face concave, sometimes subcarinate, not tuberculate nor produced anteriorly ventrad to antenna; gena narrow. Size variable 84
84 Metafemur slender, with preapical anteroventral tooth–like process. Face produced anteroventrally, projecting beyond antennifer. Scutellum with distinct emarginate rim. Large flies (14-15 mm) (Plate 168 fig. 2, plate 171 figs 7-8) ..... *Paratropidia*
– Metafemur swollen, without apicoventral process. Face concave, not projecting beyond antennifer. Scutellum without or with indistinct emarginate rim. Smaller flies (9 mm or less in length) (Plate 170 figs 5-6) ..... *Neploneura*
85 Abdomen elongate, tergum 2 not narrower than tergum 3 ..... *Xylota*
– Abdomen petiolate; tergum 2 narrower than tergum 3 86
86 Face concave, not tuberculate. Metafemur swollen, with apicoventral spines (Plate 168 fig. 4) ..... *Sphegina*
– Face tuberculate. Metafemur thin, not swollen nor with ventral spines ..... *Allobaccha*, in part

Synopsis of the fauna

The family Syrphidae is found in all biogeographic regions from the high arctic (northernmost Greenland) to the extreme south (South Georgia) except absent from the Antarctic continent. Over 6300 valid species are recognized and are distributed among some 338 groups (genera and subgenera), but many more species are known and remain to be described. In the PSWNG region currently 278 (286) species in 69 (73) genera and subgenera are recognized (numbers in brackets represent these tallies including known but undescribed species and genera, see below).

Allobaccha **Curran, 1928** (Syrphinae) is a group of Old World tropical species occurring in the Afrotropics, Indomalaya and Australia, with extension to Japan (86 total species). The last published key to the species of PSWNG area was Curran (1947). Twenty-six species are found in PSWNG area [*amphithoe* (Walker, 1849), India to Japan south to Indonesia (Flores); *annulifemur* (Meijere, 1913), Indonesia (Central Moluccas: Buru); *atra* (Doesburg, 1959), Indonesia (West Papua); *basalis* (Walker, 1848), New Guinea; *bergi* (Curran, 1947), Solomon Islands; *cochleariformis* (Sack, 1926), Philippines; *denhoedi* (Doesburg, 1959), Indonesia (West Papua); *incisa* (Walker, 1912), Philippines (Batan Island); *keiseri* (Goot, 1964), Indonesia (Lesser Sundas: Sumbawa); *macgregori* (Curran, 1929), Philippines (Luzon, Calicoan); *meijerei* (Kertész, 1913), Taiwan to Philippines, south to Indonesia (Central Moluccas: Buru, Lesser Sundas: Sumbawa); *moluccana* (Doleschall, 1857), Indonesia (Central Moluccas: Ambon); *mundula* (Wulp, 1898), Papua New Guinea; *mundulosa* (Curran, 1947), Solomon Islands; *pallida* (Meijere, 1908), New Guinea; *perpallida* (Curran, 1947), Solomon Islands; *purpuricola* (Walker, 1859), Indonesia (Aru Islands, Kei Islands); *refulgens* (Austen, 1893), Indonesia (Central Moluccas: Buru); *rubella* (Wulp, 1897), Papua New Guinea, Indonesia (Central Moluccas: Ambon), Solomons; *sapphirina* (Wiedemann, 1830), Africa






to Taiwan & Papua New Guinea; *semilimpida* (Doleschall, 1858), Indonesia (Moluccas); *signata* (Sack, 1926), Philippines; *sumbana* (Keiser, 1952), Indonesia (Lesser Sundas: Sumbawa); *vespaeformis* (Doleschall, 1857), Indonesia (Sulawesi, Central Moluccas: Ambon); *vivida* (Hull, 1944), Indonesia (Timor); *wegneri* (Keiser, 1952), Indonesia (Lesser Sundas: Sumbawa)].

***Allograpta* Osten Sacken, 1875** (Syrphinae) is a cosmopolitan genus with 73 species, four of which occur in PSWNG area [*buruensis* (Meijere, 1929), Indonesia (Central Moluccas: Buru); *distincta* (Kertész, 1899) New Guinea to Fiji & Solomons; *javana* (Wiedemann, 1824), India to Japan, east to New Guinea, Solomon Islands and Fiji; *philippina* (Frey, 1946), Philippines]. The larvae are predaceous, except for a few Neotropical species which are phytophagous.

***Archimicrodon* Hull, 1945** (Microdontinae) is an Old World genus of 39 species, eleven of which are known from the PSWNG area (Reemer & Ståhls 2013a) [*boharti* (Curran, 1947), Solomon Islands; *clavicornis* (Sack, 1926), Philippines; *grageti* (Meijere, 1908), Indonesia (West Papua); *incisuralis* (Walker, 1865), New Guinea; *investigator* (Hull, 1937), Philippines; *limbinervis* (Meijere, 1908), New Guinea; *luctiferus* (Walker, 1865), New Guinea; *malukensis* Reemer, 2013, Indonesia (North Moluccas: Halmahera); *novaeguineae* (Meijere, 1908), New Guinea; *varicornis* (Sack, 1926), Philippines; *venosus* (Walker, 1865), New Guinea]. The immatures are ant-associated inquilines.

***Asarkina* Macquart, 1834** (Syrphinae) is a genus of Old World tropical distribution (47 total species). The last revision of the genus was by Bezzi (1908), although Ghorpadé (1994) did provide a key to the Indian subcontinental species (seven species). Nine species occur in PSWNG [*biroi* Bezzi, 1908, Indonesia (West Papua), Papua New Guinea; *ericetorum* (Fabricius, 1781), Afrotropical and Indomalayan Regions, Madagascar, to Solomons, Australia (NT, Qld.); *eurytaeniata* Bezzi, 1908, Taiwan to Philippines, SW to Sumatra and SE to Solomons (Guadalcanal); *longirostris* (Meijere, 1908), Papua New Guinea; *morokaensis* (Meijere, 1908), New Guinea; *orientalis* Bezzi, 1908, China, Malay Peninsula, Philippines (Luzon, Palawan); *papuana* Bezzi, 1908, Papua New Guinea, Indonesia (West Papua), Fiji; *ribbei* Bezzi, 1908, New Guinea; *salviae* (Fabricius, 1794), Africa, India to Central Moluccas (Ambon) and Solomons (Guadalcanal)].

***Asiobaccha* Violovitsh, 1976** (Syrphinae) is a group of syrphines with petiolate abdomens and is restricted to the Indomalayan and the Australian Regions (total of 19 species). There are ten species in PSWNG area and the group was revised by Mengual (2016) [*aquila* Thompson et Mengual, 2016, Philippines; *bicolor* (Austen, 1910), Indonesia (Central Moluccas: Buru and North Moluccas), New Guinea, New Ireland and Australia; *bimaculata* (Keiser, 1952), Indonesia (Sumba); *doesburgi* Mengual, 2016, Papua New Guinea; *loriae* (Meijere, 1908), New Guinea, Indonesia (Lesser Sundas: Sumbawa) and Philippines (Luzon); *marissae* Mengual, 2016, Indonesia (Sulawesi); *nubilipennis* (Austen, 1893), India through China to Japan, Myanmar, Taiwan, Vietnam, Laos, Thailand, Malaysia, south to Indonesia (Sumatra, Java, Sulawesi); *sauteri* (Kertész, 1913), Taiwan, Vietnam, Indonesia (Sulawesi) and Philippines (Luzon); *selsi* Mengual, 2016, New Guinea; *tripartita* (Walker, 1861), Indonesia (West Papua, Kei Islands, Misool Island), New Guinea (Papua, New Ireland, Woodlark Island)].

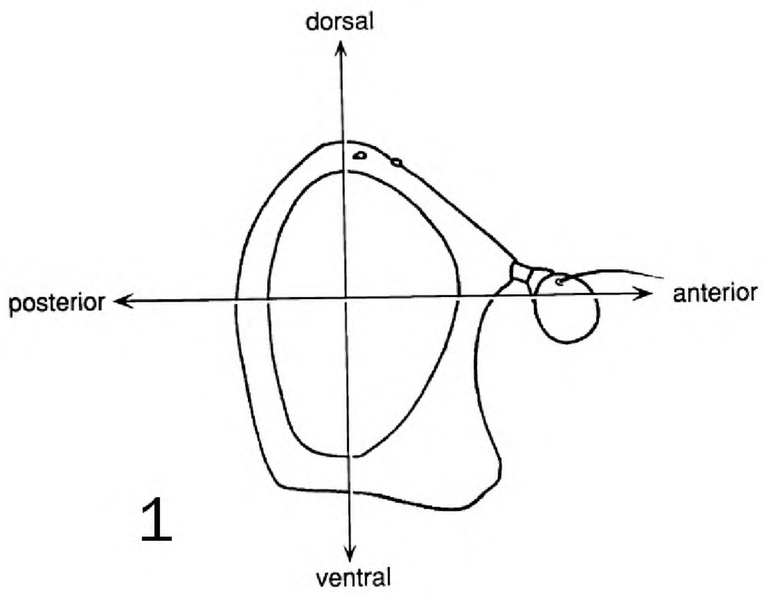
***Austalis* Thompson, 2003** (Eristalinae) is a group of rat-tailed maggots restricted to the Indomalayan and Australian Regions including 29 named species and some 11 known undescribed species (Thompson 2003), of which 13 are known from PSWNG area [*aequipars* (Walker, 1864), Indonesia (Moluccas); *bergi* (Curran, 1947), Solomons; *ciliata* (Meijere, 1913), New Guinea (West Papua); *cupreoides* (Goot, 1964), New Guinea; *erythropyga* (Walker, 1864), Indonesia (Moluccas); *inscripta* (Doleschall, 1857), Indonesia (Central Moluccas: Ambon), New Guinea (West Papua), Solomons; *latilimbata* (Meijere, 1913), New Guinea; *lucilioides* (Walker, 1861), Indonesia (North Moluccas: Bacan, West Papua: Misool); *muscoides* (Walker, 1858), Indonesia (Aru Islands, West Papua); Australia; *refulgens* (Doleschall, 1859), Indonesia (Moluccas); *resoluta* (Walker, 1858), Indonesia (Aru, Kei, Moluccas – Sula), New Guinea, Australia, Solomons; *rhina* Thompson, 2003, Solomon Is.; *triseriata* (Meijere, 1913), New Guinea].

***Austrophilus* Thompson, 2000** (Eristalinae) is a small genus of five species restricted to New Guinea and Australia (Thompson 2000). Four of the five species occur in PSWNG [*helophiloides* (Walker, 1861), Indonesia (Moluccas); *necopinus* Thompson, 2000, New Guinea (New Britain); *obscurus* Thompson, 2000, New Guinea; *terraereginae* (Ferguson, 1926), Australia, Indonesia (Aru Islands), Papua New Guinea].

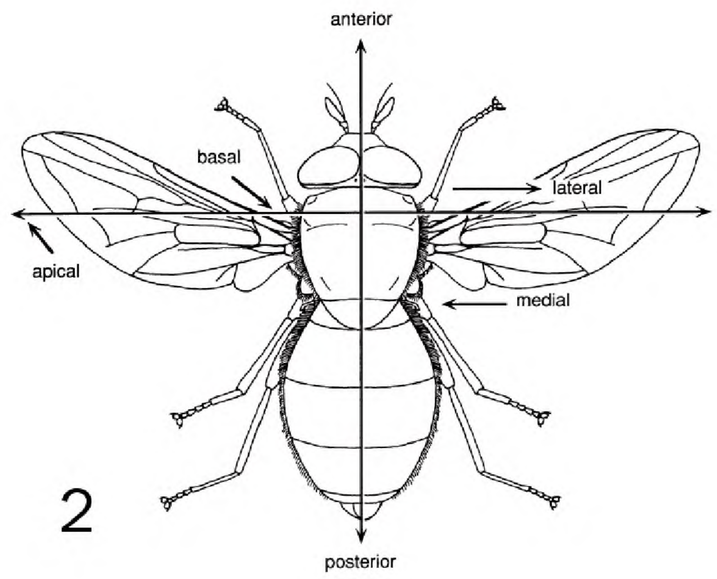




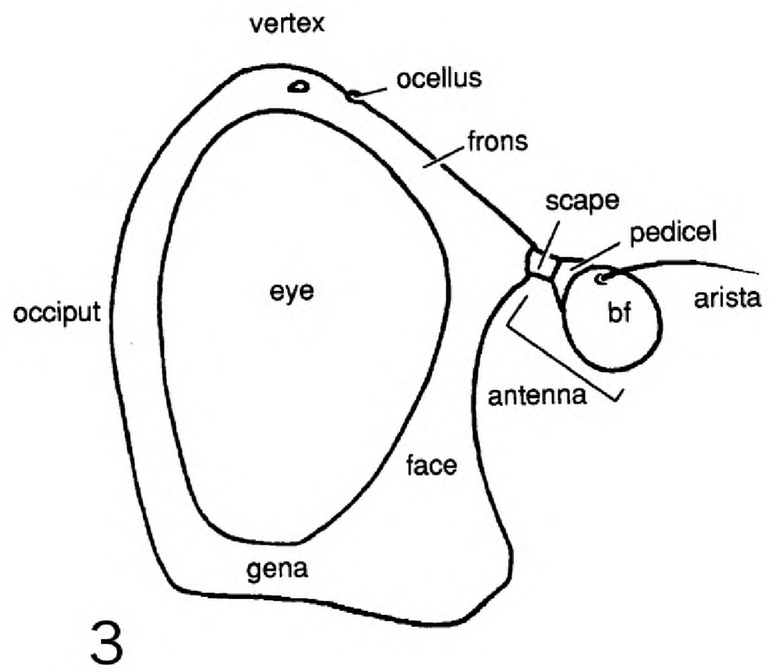




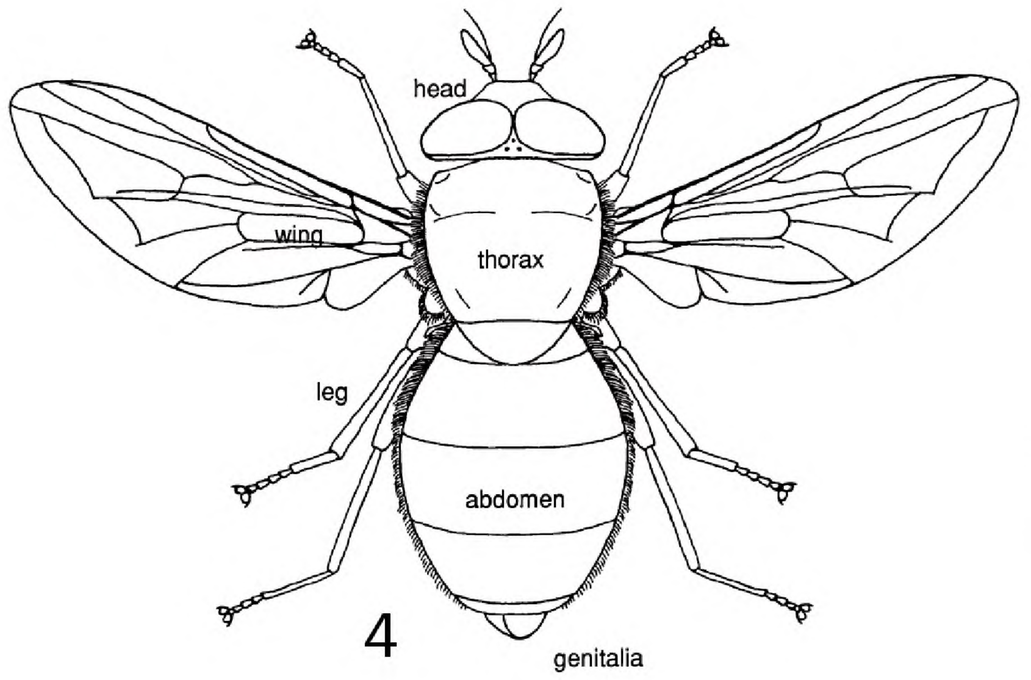
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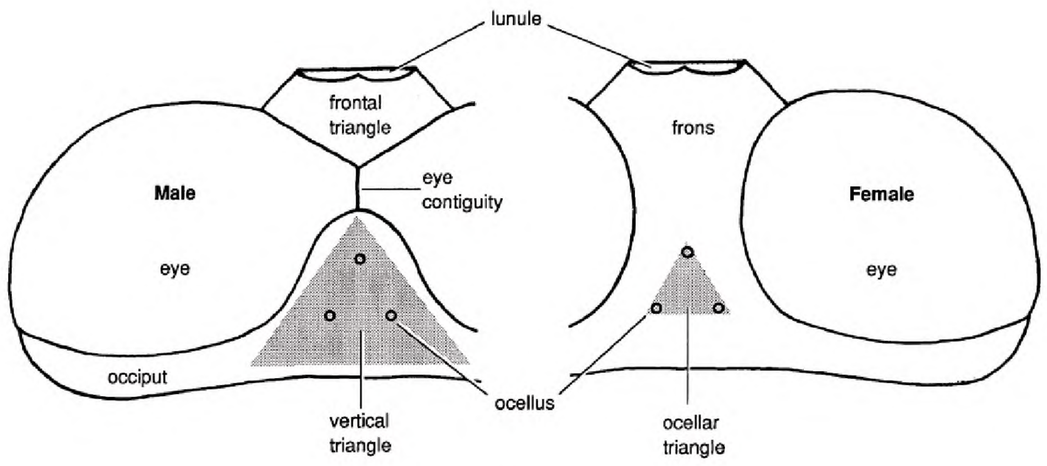
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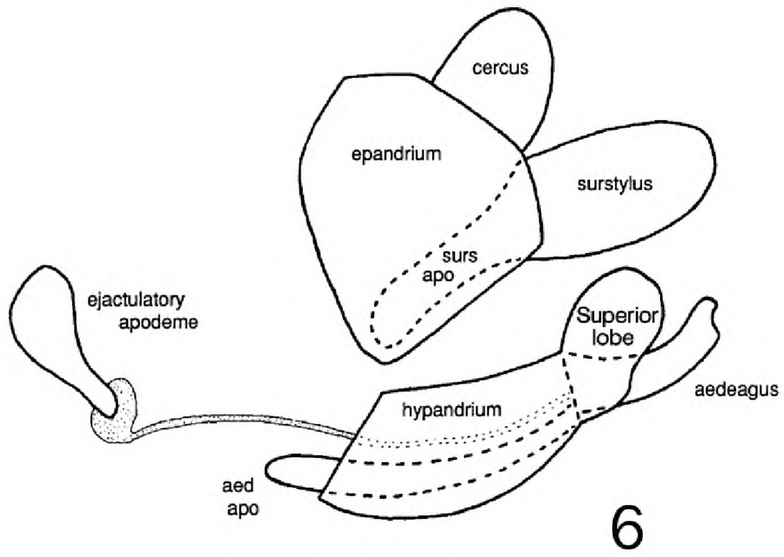
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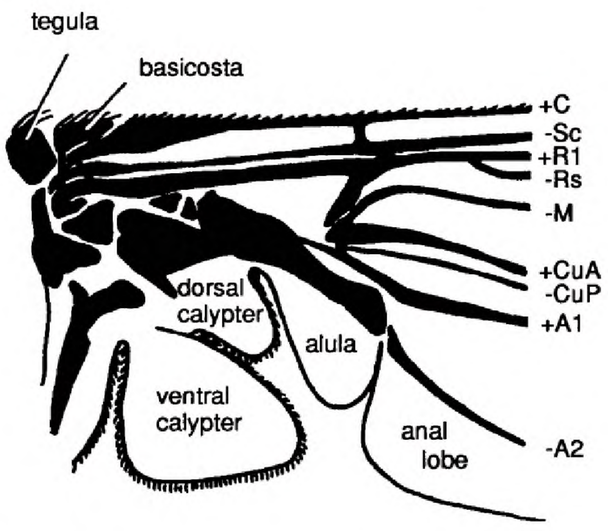
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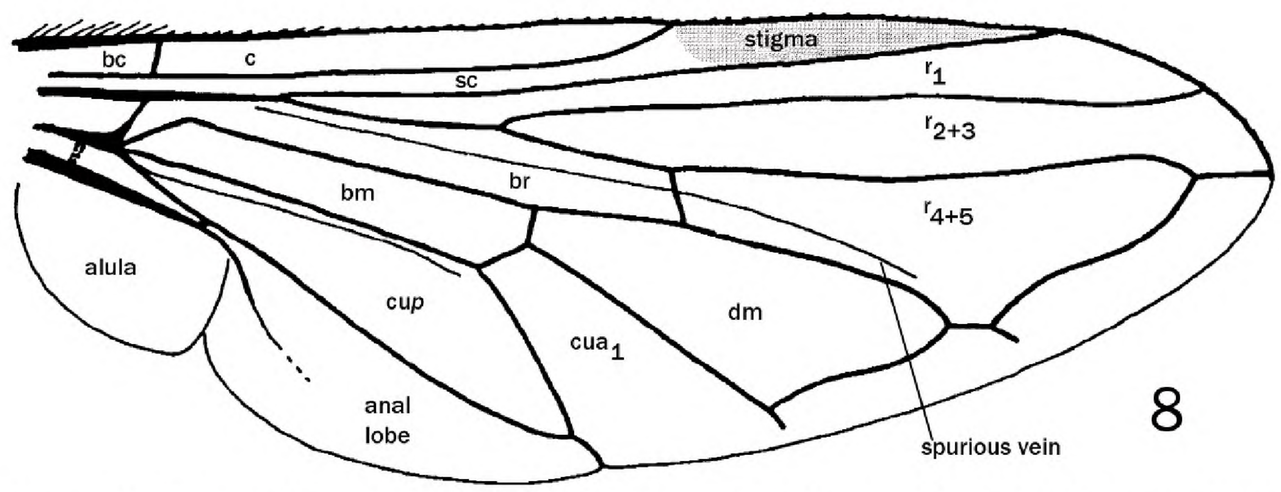
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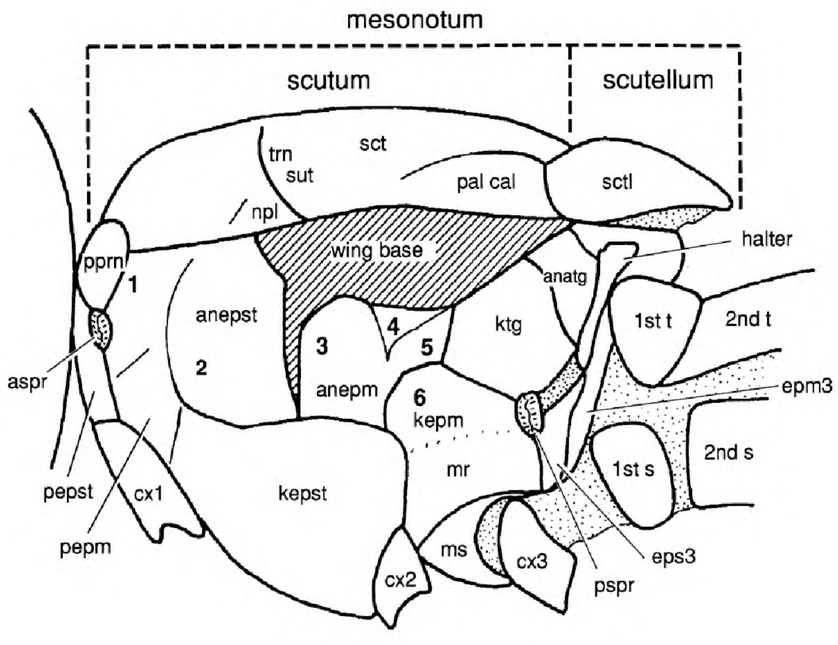


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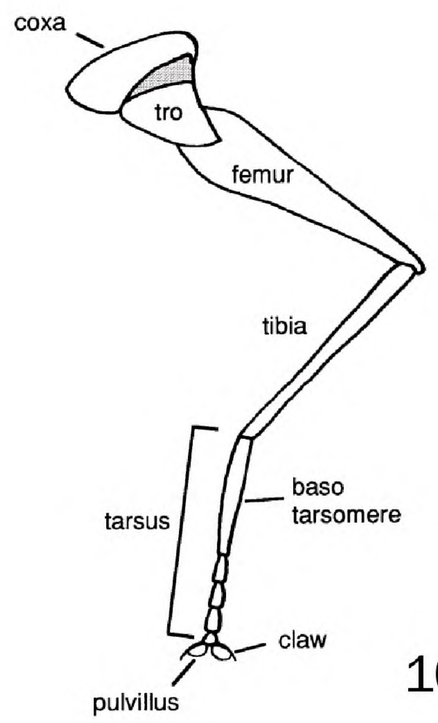
Figures 1-8. Details of Syrphidae head, body, and wing. Orientation of (1) head and (2) body; 3 – Head parts, lateral view. bf – basoflagellomere; 4 – Body parts, dorsal view; 5 – Head parts, dorsal view; 6 – Male genitalia parts, lateral view; 7 – Wing base, dorsal view. Legends: A1 – First branch of anal vein; A2 – Second branch of anal vein; C – Costal vein; CuA – Anterior branch of cubital vein; CuP – Posterior branch of cubital vein; M – Medial vein; R1 – Anterior branch of radius; Rs – Radial sector; Sc – Subcostal; 8 – Cells of wing, dorsal view. bm – Basal medial cell; bc – Basal costal cell; br – Basal radial vein; c – Costal cell; cua_1 – Anterior cubital cell; cup – Posterior cubital cell; dm – Discal medial cell; r_1, r_{2+3}, r_{4+5} – Radial cells; sc – Subcostal cell. Figures 1-8 taken from Thompson (1999a). All figures used with permission from the author.



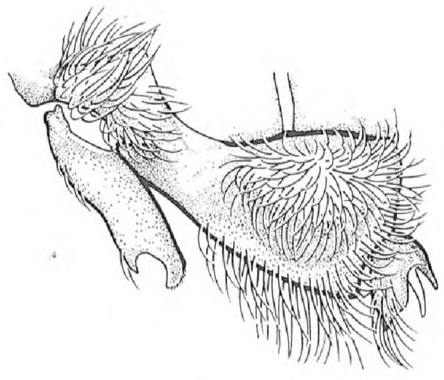


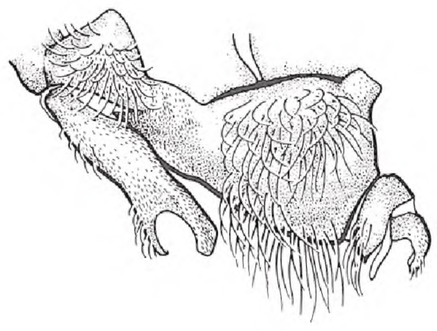
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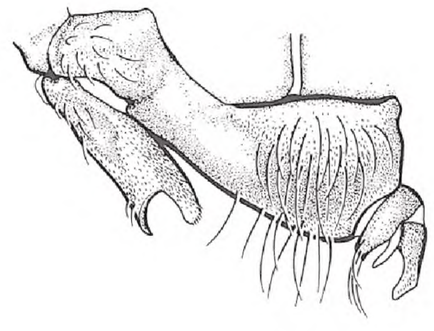
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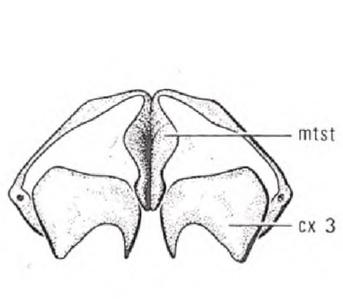
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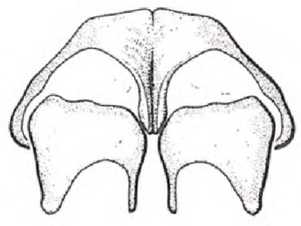
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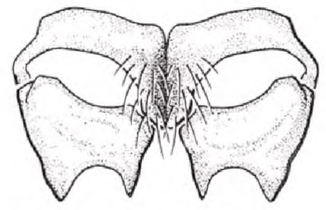
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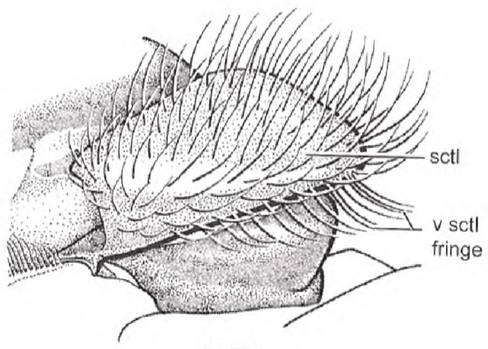
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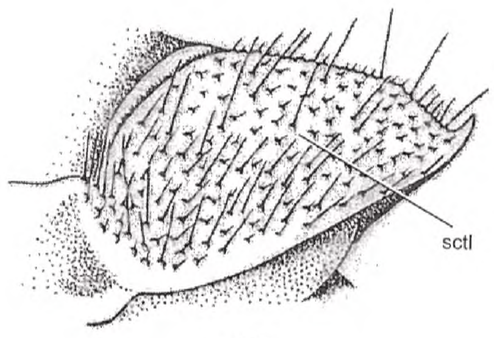
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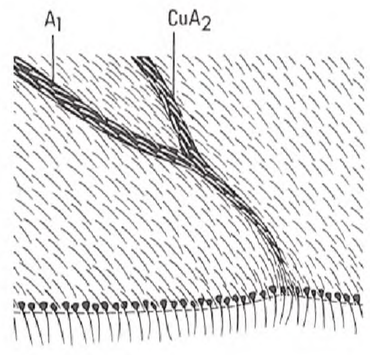
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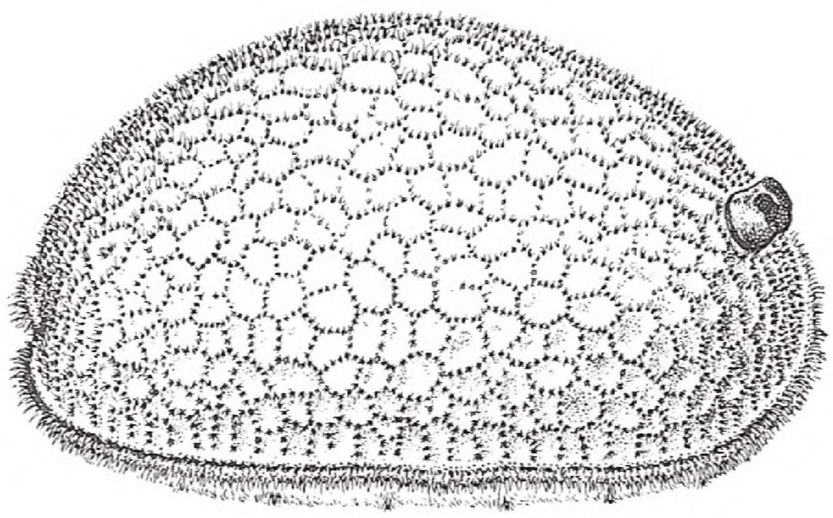


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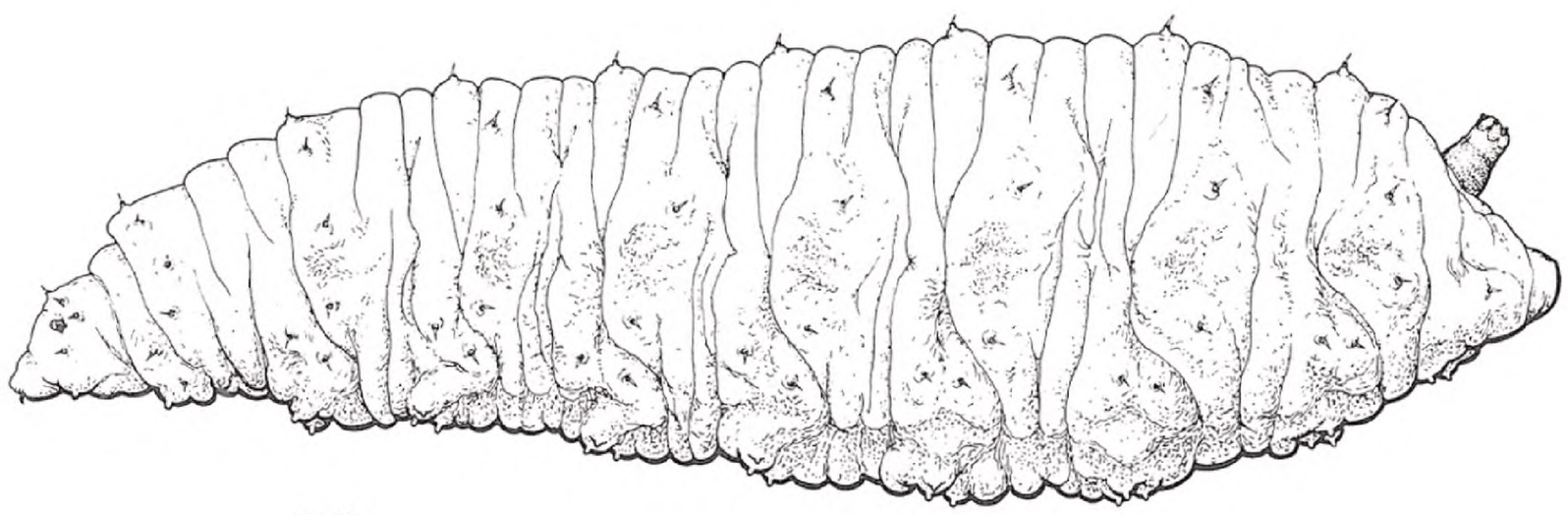


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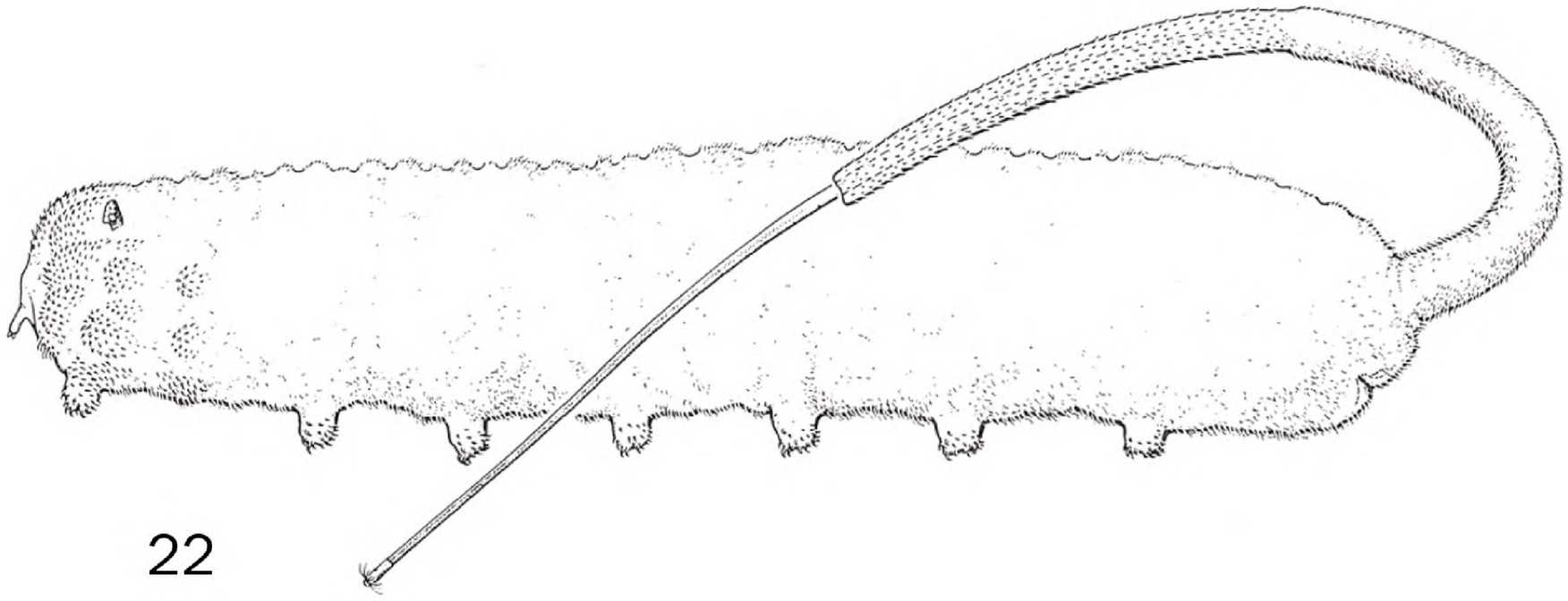
Figures 9-19. Details of Syrphidae thorax. 9 – Thorax and base of abdomen, parts, lateral view. Legends: 1 – Anterior anepisternum; 2 –Posterior anepisternum; 3 – Anterior anepimeron; 4 – Dorsomedial anepimeron; 5 – Posterior anepimeron; 6 – Katepimeron; 1st t, 2nd t – terga, first and second; 1st s, 2nd s – sterna, first and second; anatg – anatergum; anepm – anepimeron; anepst – anepisternum; aspr – anterior spiracle; cx1, cx2, cx3 – pro-, meso- and metacoxa; epm3 – metaepimeron; eps3 – metaepisternum; ktg – katatergum; kepm – katepimeron; kepst – katepisternum; mr – meron; ms – metasternum; npl – notopleuron; pal cal – postalar callus; pepst – proepisternum; pepm – proepimeron; pprn – postpronotum; pspr – posterior spiracle; sctl – scutellum; sct – scutum; trn sut – transverse suture; 10 – Leg parts, lateral view; 11-13 – Lateral view of katepisternum: 11 – *Epistrophe (E.) grossulariae* (Meigen); 12 – *Eupeodes (E.) americanus* (Wiedemann); 13 – *Epistrophe (E.) emarginata* (Say); 14-16 – Ventral views of metasternum: 14 – *Melanostoma mellinum* (Linnaeus); 15 – *Platycheirus quadratus* (Say); 16 – *Microdon piperi* Knab. Legends: mtst – metasternum; cx3 – metacoxa; 17-18 – Lateral view of scutellum: 17 – *Allograpta obliqua* (Say); 18 – *Syritta pipiens* Macquart. Legends: sctl – scutellum; v sctl fringe – ventral scutellar fringe; 19 – Posterior margin of wing of *Meliscaeva cinctella* (Zetterstedt). Figures 9-10 taken from Thompson (1999a) and figs 11-19 taken from Vockeroth & Thompson (1987). All figures used with permission from the author and from Agriculture and Agri-Food Canada respectively.



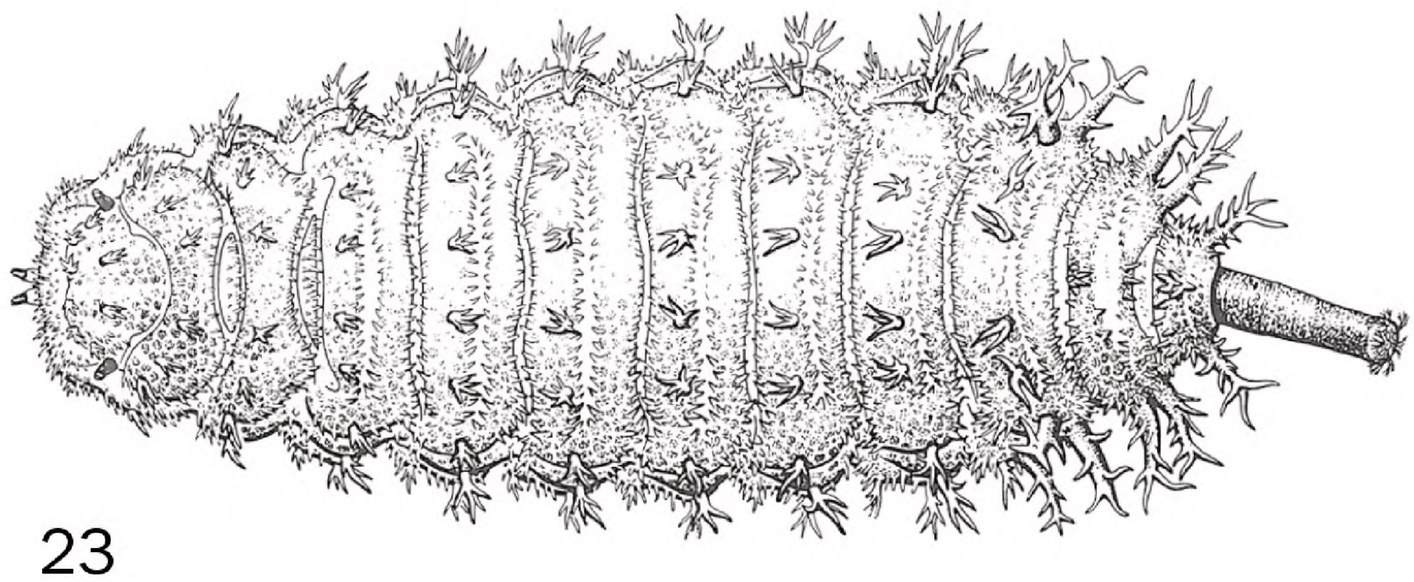
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Figures 20-23. Syrphidae larvae. 20 – *Ceriana ornata* (Saunders); 21 – *Syrphus knabi* Shannon; 22 – *Eristalis tenax* (L.), lateral view; 23 – *Brachyopa* sp., dorsal view. Figures taken from Vockeroth & Thompson (1987). All figures used with permission from Agriculture and Agri-Food Canada.



***Axona* Walker, 1864** (Eristalinae) is a monotypic genus (*chalcopyga* (Wiedemann, 1830)) that ranges from Myanmar to Micronesia and south to Australia.

***Azpeytia* Walker, 1865** (Eristalinae) is a small genus (5 species) that ranges from India to Japan, south to Australia and one species from New Guinea (Thompson 2017e) (*scutellaris* Walker, 1865).

***Baccha* Fabricius, 1805** (Syrphinae) is small north temperate genus (13 species) of predaceous flies. Only one species (*maculata* Walker, 1852) occurs in PSWNG area.

***Bardistopus* Mann, 1920** (Microdontinae) is a monotypic genus. The only known species (*papuanum* Mann, 1920) is restricted to the Solomon Islands (Mann 1920). The larvae are inquilines in the ant nest of *Technomyrmex albipes* Smith, 1861.

***Betasyrphus* Matsumura, 1917** (Syrphinae) is a small but widespread genus (19 species) in the Old World. One widespread species (*serarius* (Wiedemann, 1830)) occurs in PSWNG (from China to Indonesia (Central Moluccas: Buru and West Papua) and Australia). The larvae are predaceous.

***Calcaretropidia* Keiser, 1971** (Eristalinae) is a small genus of six species ranging from tropical Africa to New Guinea with one undescribed species in the PSWNG area (Thompson 2017d).

***Ceriana* Rafinesque, 1815** (Eristalinae) is a genus of hymenopteran mimics found in all regions except the Neotropics, and contains many likely paraphyletic subgenera that are in need of revision. Three of them, *Ceriana sensu stricto*, *Monoceromyia*, and *Oculovillosa*, are found in the PSWNG area. Three species of *Ceriana s. s.* occur in PWNG area and Thompson (2015a) provided a key to the two Papuan species [*annulifera* Walker, New Guinea; *metallica* Wulp, 1898, Papua New Guinea; *relictura* Walker, Indonesia (Aru Islands)].

***Chalcosyrphus* Curran, 1925** (Eristalinae) is a worldwide group of 107 species that is split into up to ten subgenera, one of which occurs in PSWNG (*Neploneura* Hippa, 1978 - see below) and two (*Syrittoxylota* Hippa, 1978 and *Xylotina* Hippa, 1978) occur nearby in the Indomalayan Region (Hippa 1985).

***Chymophila* Macquart, 1834** (Microdontinae) is here treated as a subgenus of *Microdon* and occurs in most regions (total of 34 species), except it is absent from the Afrotropical and Australian Regions. The immatures are ant-associated inquilines. One species (*stilboides* (Walker, 1849)) occurs in the PSWNG area (known from Taiwan, India, Java and the Philippines).

***Citrogramma* Vockeroth, 1969** (Syrphinae) is a group of syrphines restricted to the Indomalayan and Australian regions (42 species). The genus was last revised by Mengual (2012). There are 19 species in the PSWNG area [*amarilla* Mengual, 2012, India, Nepal, Java, Philippines, Thailand, Laos, Hainan; *bicornutum* Vockeroth, 1969, Papua New Guinea; *circumdatum* (Meijere, 1908), New Guinea; *clarum* (Hervé-Bazin, 1923), Vietnam, Thailand, Borneo, Philippines, Taiwan, Java, Malay Peninsula (Pahang); *distinctum* Thompson, 2012, New Guinea; *luteifrons* (Meijere, 1908), Indonesia (West Papua, Sulawesi); *luteopleurum* Mengual, 2012, New Guinea; *matsumurai* Mengual, 2012, Taiwan, New Guinea; *pintada* Mengual, 2012, New Guinea; *pinyton* Mengual, 2012, New Guinea; *quadratum* Mengual, 2012, New Guinea; *quadricornutum* Vockeroth, 1969, New Guinea; *robertsi* Wyatt, 1991, New Guinea; *schlingeri* Thompson, 2012, New Guinea; *sedlacekorum* Vockeroth, 1969, New Guinea; *solomonense* Wyatt, 1991, Solomon Islands, Papua New Guinea (Bougainville and New Britain islands); *triton* Mengual, 2012, New Guinea; *wyatti* Mengual, 2012, New Guinea; *Citrogramma* sp1 Mengual, Papua New Guinea (New Ireland island)].

***Dasysyrphus* Enderlein, 1938** (Syrphinae) is north temperate with limited extensions into South America and to the Philippines in the Indomalayan Region. Worldwide, the genus consists of 50 named species. The only PSWNG species is an unnamed species found in the Philippines.

***Dideoides* Brunetti, 1908** (Syrphinae) is a small Indomalayan and Palaearctic group of 11 described species. Only one species is known from PSWNG, an unnamed species from the Philippines.

***Dideopsis* Matsumura, 1917** (Syrphinae) is a small genus of two species. One wide-ranging species, *aegrota* (Fabricius, 1805), ranges from the Himalayas to northern Australia while the other species, (*pura* Curran, 1928) is more restricted: Solomons (Guadalcanal), Indonesia (West Papua),









and Philippines (Luzon).

***Digulia* Meijere, 1913** (Eristalinae) is a little known genus restricted to New Guinea from the region of the river Digula, as the name implies. Thompson (2017a) reviewed the genus. There is only one known species (*kochi* Meijere, 1913).

***Dissoptera* Edwards, 1915** (Eristalinae) is a small genus of eristaline flies (seven species) ranging from Borneo to Samoa, south to Australia. One species occurs in PSWNG (*heterothrix* (Meijere, 1908), Borneo to Australia, New Hebrides).

***Dolichomerus* Macquart, 1850** (Eristalinae) is here treated as a subgenus of *Phytomia* and contains one species (*crassus* (Fabricius, 1787)) found in the Indomalayan Region (India to Timor).

***Eosphaerophoria* Frey, 1946** (Syrphinae) is a group restricted to the Indomalayan Region and New Guinea (11 total species). The genus was revised by Mengual & Ghorpadé (2010) and six species occur in PSWNG [*adornata* Mengual, 2010, Papua New Guinea; *bifida* Mengual, 2010, Papua New Guinea; *hermosa* Mengual, 2010, Indonesia (North Moluccas: Halmahera); *luteofasciata* Mengual, 2010, Papua New Guinea (New Ireland); *marginata* Frey, 1946, Philippines, Thailand; *nigrovittata* Mengual, 2010, Papua New Guinea, Indonesia].

***Epistrophe* Walker, 1852** (Syrphinae) is a north temperate group (50 total species) with limited distribution in the Indomalayan Region. Only one species occurs within PSWNG (*shibakawae* (Matsumura, 1917), New Guinea).

***Episyrphus* Matsumura et Adachi, 1917** (Syrphinae) is a wide-ranging group in the Old World with 22 species. Four species are definitively known in the PSWNG area [*contax* (Curran, 1947), Solomons; *contractus* (Keiser, 1952), Indonesia (Lesser Sundas: Sumbawa); *demeijerei* (Curran, 1947), Solomons, New Guinea; *viridaureus* (Wiedemann, 1824), widespread throughout]. *Episyrphus balteatus* (De Geer, 1776) may occur in the region and has been definitively collected and identified as far south as Taiwan. This species ranges throughout the Palearctic and at least some populations are migratory. Much of the earlier collected material from the region is identified as *E. balteatus*, much or all of it likely incorrectly as this genus is badly in need of a revision and not well understood.

***Eristalinus* Rondani, 1845** (Eristalinae) is a large worldwide genus (87 total species) although the few species in the New World were introduced from the Old World. The genus is divided into five subgenera, of which only two subgenera (*Eristalodes* Mik, 1897 and *Lathyrophthalmus*, Mik, 1897) are found in the PSWNG area. The typic subgenus is restricted to one species (*sepulchralis* Linnaeus) in Europe to Japan, south to India.

***Eristalis* Latreille, 1804** (Eristalinae) was a broadly defined genus including many diverse species. Here the concept is restricted to just two species (*tenax* (Linnaeus, 1758) and *proserpina* Wiedemann, 1830). *Eristalis tenax* is a widespread parasynthanthropic species, but is rare in tropical areas. *Eristalis proserpina* is known only from southeastern China. *Eristalis cingulata* Sack, 1927 [from Negros, Philippines] is a *nomen dubium* and only known from its original description and the two female syntypes are apparently lost, neither being in the Baker collection (USNM) or Sack's collection.

***Eristalodes* Mik, 1897** (Eristalinae) is here treated as a subgenus of *Eristalinus* and is a small group (total 10 species) occurring mostly in southern Europe and Africa. There is only one PSWNG species [*paria* (Bigot, 1880), Sri Lanka, Taiwan, India, Java, Moluccas].

***Eumerus* Meigen, 1822** (Eriatalinae) is a large Old World genus (266 species) ranging to Fiji with several economic pests introduced into the New World. There are nine described PSWNG species [*argentipes* Walker, 1861, Taiwan to Philippines, south to Sri Lanka, Moluccas, New Guinea; *aurifrons* (Wiedemann, 1824), India to Philippines, south to Indonesia, Solomons, Australia, Hawaii; *bimaculatus* Doleschall, 1858, Moluccas; *ergator* Hull, 1941, Philippines (Mindanao); *flavicinctus* Meijere, 1908, Taiwan, Java, Philippines, Lesser Sundas: Bali; *niveipes* Meijere, 1908, Indonesia (Java, Lesser Sunda Islands), Philippines; *quadratimaculatus* Keiser, 1952, Indonesia (Lesser Sundas: Sumbawa); *speculifer* Sharp, 1899, New Guinea, Australia, Lord Howe Island, Solomons; *sutteri* Keiser, 1952, Indonesia (Lesser Sundas: Sumbawa)] with many more undescribed.

***Giluwea* Vockeroth, 1969** (Syrphinae) is a small genus of syrphines endemic to New Guinea where it is restricted to the alpine areas. Only two species (*flavomaculata* Vockeroth, 1969 and *nigra* Vockeroth, 1969) have been described (Vockeroth






1969).

***Graptomyza* Wiedemann, 1820** (Eristalinae) is a widespread genus (90 species) in the Old World tropics and in the Pacific. Eighteen species are recorded from the Philippines and New Guinea, but more are known but not yet described [*atripes* Bigot, 1883, Moluccas Islands; *bergi* Greene, 1949, Solomon Islands; *chaetomelas* Doesburg, 1966, New Guinea; *coniceps* Meijere, 1929, Central Moluccas: Buru; *flavipes* Meijere, 1911, Borneo, Java, Philippines; *flavorhyncha* Hull, 1949, Philippines, Mindanao; *globigaster* Hull, 1943, Philippines, Biliran; *lineata* Osten Sacken, 1881, Malaya, Moluccas; *literata* Osten Sacken, 1882, Philippines; *longicornis* Meijere, 1908, New Guinea; *melliponaeformis* Doleschall, 1858, Sulawesi, Central Moluccas: Ambon; *microdon* Osten Sacken, 1882, Philippines; *phyllocera* Hull, 1950, Philippines, Luzon; *punctata* Meijere, 1908, New Guinea; *setigloba* Hull, 1941, Philippines; *tibialis* Walker, 1858, Aru Islands; *trilineata* Meijere, 1908, New Guinea; *triseriata* Meijere, 1929, Central Moluccas: Buru].

***Heliodon* Reemer, 2013** (Microdontinae) is a genus of eight species that are restricted to the Indomalayan Region. Only one species occurs in Wallacea, *tricinctus* (Meijere, 1908) (known from the Philippines and Java).

***Imatisma* Macquart, 1842** (Eristalinae) is here treated as a subgenus of *Mallota* Meigen, 1822 and contains four species that are distributed in the Neotropical, Palaearctic and Indomalayan Regions. One undescribed species occurs in the Philippines.

***Indascia* Keiser, 1958** (Microdontinae) is a small genus of only four described species that were thought to be restricted to the Indomalayan Region (Reemer & Ståhls 2013a). There are another five undescribed species, with one each from the Philippines and New Guinea (Thompson 2017f). The latter two are the first known species from PSWNG and the New Guinea species is the first known species from outside of the Indomalayan Region.

***Ischiodon* Sack, 1913** (Syrphinae) is a common widespread group of two species found throughout the Afrotropics and the Indomalayan Region with extensions to southern Palaearctic. In the PSWNG area, *scutellaris* (Fabricius, 1805) ranges from Japan and India to Australia and the Pacific islands.

***Keda* Curran, 1931** (Eristalinae) is a monotypic genus (*conclusa* (Walker, 1859)) that is restricted to the Sulawesi, Borneo and New Guinea.

***Kertesziomyia* Shiraki, 1930** (Eristalinae) is here considered a broad genus with three subgenera, all of which may be expected in the PSWNG area (*Kertesziomyia*, *Pseuderistalis* Shiraki, 1930 and New Subgenus A (see below) Thompson & Vockeroth in prep.). *Kertesziomyia* sensu stricto contains four species and ranges from India to Japan, south to Australia. None of the species of *Kertesziomyia* s. s. are currently known from PSWNG.

***Kryptopyga* Hull, 1944** (Microdontinae) is a small genus of two species of and is only found in the Indomalayan Region (Reemer & Ståhls 2013a). There are no known species from PSWNG area, but the group is included in the key as they may be found there in the future.

***Lathyrophthalmus* Mik, 1897** (Eristalinae) is here treated as a subgenus of *Eristalinus* and includes 16 species in the PSWNG area [*aeneus* (Scopoli, 1763), widespread, parasynanthropic species; *arvorum* (Fabricius, 1787) widespread in the Indomalayan Region to Hawaii and Australia; *aurulans* (Wiedemann, 1824) widespread throughout Indonesia and New Guinea, Solomons; *buruensis* (Meijere, 1929) Indonesia (Central Moluccas: Buru); *cupreofasciatus* (Wulp, 1868) North (Bacan) and Central Moluccas (Ambon, Seram); *flavus* (Sack, 1926) Indonesia to Philippines, Micronesia; *lunatus* (Meijere, 1908) Moluccas to Solomons; *megacephalus* (Rossi, 1794) widespread synanthropic species, Philippines; *obliquus* (Wiedemann, 1824) Southern Indomalaya to East Indonesia (Kei Islands); *placens* (Walker, 1864) Indonesia (West Papua: Misool), Papua New Guinea, Solomons; *punctulatus* (Macquart, 1847) Solomons; *quinquestriatus* (Fabricius, 1794) widespread throughout Indomalaya south to Indonesia (Central Moluccas: Buru); *sextus* Curran, 1947 Solomons; *splendens* (Le Guillou, 1842) New Guinea, Solomons; *suavissimus* (Walker, 1858) Indonesia (Aru Islands, West Papua), Papua New Guinea, Solomons: New Georgia, Guadalcanal; *tristriatus* (Meijere, 1911) Java, Philippines, Negros].

***Macrosyrphus* Matsumura, 1917** (Syrphinae) is here treated as a subgenus of *Eupeodes* Osten Sacken, together with another two subgenera (*Eupeodes* and *Metasyrphus*). The genus *Eupeodes* is mainly north temperate with limited extensions





into the tropics, and only one *Macrosyrphus* species (*confrater* (Wiedemann, 1830)) ranges to New Guinea.

***Mallota* Meigen, 1822** (Eristalinae) is a paraphyletic group in need of taxonomic revision. *Imatisma* Macquart, 1842 *and Tigridemyia* Bigot, 1882 are two subgenera of *Mallota* that occur in the PSWNG region and are thus treated here.

***Matsumyia* Shiraki, 1949** (Eristalinae) is a Palearctic/Indomalayan group (11 described species), with one species known from the Philippines (*cyaniventris* **comb. nov.** (Sack, 1926)).

***Melangyna* Verrall, 1901** (Syrphinae) is divided into three subgenera, one (*Melangyna*) is north temperate and two are endemic to New Guinea (*Melanosyrphus* Vockeroth, 1969) and Australia (*Austrosyrphus* Vockeroth, 1969).

***Melanosyrphus* Vockeroth, 1969** (Syrphinae) is usually considered a subgenus of *Melangyna* and contains a single described species (*dichoptica* Vockeroth, 1969) known only from New Guinea (Vockeroth 1969) plus an undescribed species from West Papua.

***Melanostoma* Schiner, 1860** (Syrphinae) is found in all regions (56 total species) and four species occur in PSWNG area [*apicale* Bigot, 1884, Papua New Guinea, New Caledonia, Solomons, Fiji, Samoa, Tonga, Australia; *atrum* Sack, 1932, Indonesia (Lesser Sundas: Lombok); *fumivenosum* Doesburg, 1966, New Guinea; *univittatum* (Wiedemann, 1824) throughout SE Asia, including Indonesia (Central Moluccas: Buru)].

***Meliscaeva* Frey, 1946** (Syrphinae) is a north temperate group (28 species) with two species known from the Philippines [*angustatus* (Sack, 1926) Philippines (Luzon); *melanostomoides* (Hull, 1941) Java, Philippines (Mindanao)].

***Merodonoides* Curran, 1931** (Eristalinae) is here treated as a subgenus of *Eristalinus* and is restricted to the Afrotropical and Indomalayan Regions. Only one species (*fasciatus* (Macquart, 1834)) is known from Indomalaya (Thompson 2015b).

***Mesembrius* Rondani, 1857** (Eristalinus) is another Old World tropical group ranging from one species in southern Europe to South Africa and Australia (56 total species). Ten species occur in PSWNG [*bengalensis* (Wiedemann, 1819), India to Papua New Guinea, Australia; *bergi* Curran, 1947, Solomon Islands; *caudatus* (Meijere, 1904) Indonesia (Aru Islands); *fulvicauda* Curran, 1947 Solomon Islands; *fulvus* (Meijere, 1908), New Guinea; *hilaris* (Walker, 1849), New Guinea, Australia, New Caledonia; *mesoleuca* (Walker, 1858), Indonesia (Aru Islands); *pilipes* (Doleschall, 1857), Java, Indonesia (Central Moluccas: Ambon); *quadrivittatus* (Wiedemann, 1819), India, Java, Moluccas; *wulpi* Goot, 1964, Taiwan to Philippines, Java, New Guinea (West Papua), Indonesia (Aru)].

***Metadon* Reemer, 2013** (Microdontinae) was established by Reemer and Ståhls (2013a) for a group of 42 species that are widely distributed in the Old World. Four species occur in PSWNG (*auricinctus* (Brunetti, 1908), Sri Lanka Taiwan, India, Philippines; *bicoloratus* (Hull, 1944), Lesser Sundas: Sumbawa; *rutilus* (Keiser, 1952), Lesser Sundas: Sumbawa; and *sacki* (Goot, 1964), Philippines). The two species that were collected by Wallace on the Aru Islands off the southwest coast of New Guinea are the only known species from the Australian Region (*apicalis* (Walker, 1858) and *fulvicornis* (Walker, 1858)).

***Microdon* Meigen, 1803** (Microdontinae) is cosmopolitan except absent in New Zealand and the smaller oceanic islands. The immatures are inquilines in ant nests, where they prey on the brood. There are several subgenera recognized, of which only *Chymophila* Macquart, 1834 and *Microdon* s.s. occur in the PSWNG region. Overall, there are 126 species worldwide, including only three in the PSWNG area (one species in the subgenus *Chymophila* see above) and two in the nominate subgenus both known only from Sumbawa, Lesser Sundas (*aeneus* Keiser, 1952 and *sumbanus* Keiser, 1952). There are also two unplaced species of Microdontinae from the region: *obscurus* Wulp, 1898 (Papua New Guinea) and *sharpii* Mik, 1900 (New Britain).

***Milesia* Latreille, 1804** (Eristalinae) is a large Indomalayan group with a few species in the north temperate region and northern Neotropics (79 total species). The group was revised by Hippa (1990) and 11 species occur in PSWNG [*bigoti* Osten Sacken, 1882, Philippines (Luzon); *confluens* Hippa, 1990, Philippines; *conspicienda* Walker, 1859, Sulawesi, Philippines; *crinita* Hippa, 1990, Philippines; *dearmata* Hippa, 1990, Philippines;






labellata Hippa, 1990, Philippines; *macularis* Wiedemann, 1824, Indonesia (Java, Lesser Sundas: Sumbawa); *reinwardtii* Wiedemann, 1824, Borneo, Indonesia (Java), Malaya, Philippines (Luzon); *ritsemae* Osten Sacken, 1882, Philippines, (Luzon); *semperi* Osten Sacken, 1882, Philippines (Luzon, Negros, Mindanao); *simulator* Hippa, 1990, Indonesia (Lesser Sundas: Lombok)].

***Monoceromyia* Shannon, 1922** (Eristalinae) is here treated as a subgenus of *Ceriana.* It is a worldwide group of hymenopteran mimics. Thompson (2015a) provides a key to the New Guinea species and Thompson & van Steenis (2017) review the Philippine species. Three species occur in the PSWNG area (75 total species) [*metallica* (Wulp, 1898), New Guinea, Australia; *petersi* (Speiser, 1924), Philippines (Luzon); *smaragdina* (Walker, 1858), Indonesia (Aru Islands), Australia].

***Myolepta* Newman, 1838** (Eristalinae) occurs in all regions except the Australian Region (42 total species). There are no known species from PSWNG area, but the group is included in the key as they may be found there in the future.

***Nepenthosyrphus* de Meijere, 1932** (Eristalinae) is a small endemic Indomalayan group (five total species), with one species (*venustus* Thompson, 1971) in the Philippines (Thompson 1971; Hippa 1978; Rotheray et al. 2012).

***Neploneura* Hippa, 1978** (Eristalinae) is here treated as a subgenus of *Chalcosyrphus* and is a small endemic group restricted to the Australian Region (four total species), two of which occur in PSWNG area [*melanocephala* Hippa, 1978, New Guinea; *ventralis* (Walker, 1858), Indonesia (Aru Islands)].

New Subgenus A Thompson et Vockeroth, in prep. (Eristalinae) is a small subgenus of *Kertesziomyia* restricted to the Moluccas and northern Australia and consisting of two species the PSWNG area [*bidentata* (Sack, 1926) (Philippines) and *conducta* (Walker, 1858) (Moluccas to Australia)] (Thompson 2017c).

***Oculovillosa* Thompson, 2015** (Eristalinae) is a monotypic (*ismayi* Thompson, 2015) subgenus of *Ceriana* endemic to New Guinea (Thompson 2015a).

***Ornidia* Lepeletier et Serville, 1828** (Eristalinae) is a small group (five species) of New World subtropical species (Carvalho Filho & Esposito 2009), of which one species (*obesa* (Fabricius, 1775)) is parasynanthropic and has spread to most tropical areas of the World including PSWNG (Thompson 1991).

***Pandasyopthalmus* Stuckenberg, 1954** (Syrphinae) is considered a subgenus of *Paragus*. It is primarily an Old World group with only one of the 30 species known from the Nearctic. Three species are found in PSWNG area [*atratus* (Meijere, 1906), from Malay Peninsula to New Guinea; *goeldlini* (Thompson, 1992), Timor; *keiseri* (Goot, 1964), Java, Lesser Sundas: Sumbawa].

***Paragus* Latreille, 1804** (Syrphinae) is a worldwide group except with only limited distribution in the Neotropics (south only to Costa Rica). The genus is currently divided into four subgenera of which three are found in the PSWNG region: *Pandasyopthalmus, Paragus* and *Serratoparagus*. *Paragus* (*Paragus*) *stuckenbergi* Thompson is the only species in the nominate subgenus found in the region and it is endemic to the Philippines (Thompson & Ghorpade 1992).

***Paramicrodon* de Meijere, 1913** (Microdontinae) is a small group of eight species restricted to the tropics (Australian, Neotropical and Indomalayan Regions] with four species known from PSWNG area (Reemer & Ståhls 2013) [*cinctellus* (Sack, 1926), Philippines; *lorentzi* Meijere, 1913, New Guinea; *novus* Hull, 1913, Philippines; *toxopei* Meijere, 1929, Central Moluccas: Buru]. The immatures are presumed to be inquilines in ant nests as are other microdontine flies.

***Paramixogaster* Brunetti, 1923** (Microdontinae) is a medium sized group of hymenopteran mimics restricted to the Old World tropics, with four species found within the PSWNG area (Reemer & Ståhls 2013a) [*indicus* (Doleschall, 1857), Bali; Moluccas; *odyneroides* (Meijere, 1908), New Guinea; *vespiformis* (Meijere, 1908), Java, Malay Peninsula, Central Moluccas: Buru; *wegneri* Keiser, 1964, Moluccas].

***Paratropidia* Hull, 1949** (Eristalinae) is here treated as a subgenus of *Orthoprosopa Macquart*, 1850. Thompson (1972b) provides a revision of the genus and Hippa (1980) added an additional species from New Caledonia. It is an endemic Aus-







Map 1. Range map (shaded region shows the range extent covered in this chapter).






tralian regional group of five species known from New Guinea, New Caledonia and New Zealand. Two *Paratropidia* species occur in the PSWNG area [*alex* Thompson, 1972, New Guinea; *margarita* Thompson, 1972, New Guinea].

***Parocyptamus* Shiraki, 1930** (Microdontinae) is a small Indomalayan group of two species of Microdontinae. Neither species is known from the PSWNG area but it is included in the event that they are found.

***Petioleomyia* Thompson et Vockeroth, 2017** (Syrphinae) is here treated as a subgenus of *Allobaccha*, and is a small Indomalayan group of five species, with three species in the Philippines [*macgregori* (Curran, 1934), *semperi* Thompson, 2017, *signata* (Sack, 1926)] (Thompson 2017b).

***Philippinophilus* Thompson, 2017** (Eristalinae) is a monotypic (*celeber* Osten Sacken, 1882) genus endemic to Mindanao. It is apparently rare, as only two specimens of it are known (Thompson 2017b).

***Phytomia* Guerin-Meneville, 1833** (Eristalinae) is a group restricted to the Old World and is divided into two subgenera (the other is *Dolichomerus*, see above). The typic subgenus (19 total species) ranges from the Far Eastern Palaearctic to Africa and Australia (absent from the western and central Palaearctic). Two species occur in PSWNG area (*errans* (Fabricius, 1787) in the Philippines and *zonata* (Fabricius, 1787) through the Indomalayan Region and south to New Guinea).

***Platycheirus* Lepeletier et Serville, 1828** (Syrphinae) is a large, mainly north temperate group with limited extension into the northern Indomalayan Region and into the Neotropics along the Andes (202 total species). One species (*albimanus* (Fabricius, 1781)) extends into the Philippines.

***Pseuderistalis* Shiraki, 1930** (Eristalinae) is considered a subgenus of *Kertesziomyia* and is restricted to the Indomalayan and Australian Regions, with 18 described species but many more undescribed ones. Nine species occur in the PSWNG area [*aeneicinctus* (Meijere, 1929), Indonesia (Central Moluccas: Buru); *conducta* (Walker, 1858), Philippines (Mindanao, Calicoan), Indonesia (Sulawesi), New Guinea, New Britain, Australia, Solomons (Guadalcanal); *distinctus* (Meijere, 1913), New Guinea; *fascipennis* Thompson, 1975, Myanmar, India (Assam), Java, Philippines; *marfax* (Curran, 1947), Solomon Islands; *nigra* (Wiedemann, 1824), Southeast Asia, Indonesia to Moluccas; New Guinea; *obliterans* (Walker, 1860), Moluccas; *semisplendens (*Sack, 1926), Philippines (Luzon, Palawan, Leyte); *velutina* (Sack, 1926), Philippines (Negros)].

***Psilota* Meigen, 1822** (Eristalinae) is a north temperate group of 32 species with limited extension into the Indomalayan Region and an expansion in the Australian Region. Two species, *basalis* (Walker, 1858) (Aru Islands) and *fasciata* Curran, 1929 (Philippines), are recorded from PSWNG.

***Rhingia* Scopoli, 1763** (Eristalinae) is a large, almost worldwide, genus only absent from the Australian Region, consisting of 46 described species. Only one unnamed species occurs in the PSWNG region (from the Philippines).

***Serratoparagus* Vujić et Radenković, 2008** (Syrphinae) is usually accepted as a subgenus of *Paragus* restricted to the Afrotropics and the Indomalayan Region. *Serratoparagus* contains only one species (*crenulatus* (Thomson, 1869)), which ranges throughout Indomalaya south into Australia. This species is an aphid predator in its larval stages.

***Solenaspis* Osten Sacken, 1881** (Eristalinae) is a monotypic genus for an endemic New Guinea species (*nitens* (Bigot, 1880)).

***Sphaerophoria* Lepeletier et Serville, 1828** (Syrphinae) is a largely north temperate genus of 77 species with limited extensions into southern regions. There is one widespread species (*macrogaster* (Thomson, 1869)) that occurs in New Guinea and ranges into Australia.

***Sphegina* Meigen, 1822** (Eristalinae) is a north temperate genus (122 total species) with extensions into the Indomalayan Region. Only one species is known from the Philippines (*philippina* Thompson, 1999b). The larvae are known to feed in sap of tree wounds.

***Syritta* Lepeletier et Serville, 1828** (Eristalinae) is a large and now worldwide genus of some 60 described species (with several more undescribed known); those now found in the New World were introduced from the Old World. Lyneborg and Barkemeyer (2005) provide a revision of the genus. Nine species occur in PSWNG [*aenigmatopatria*






Hardy, 1964, Hawaii, Micronesia, Philippines, Indonesia (Sumatra, Java); *indica* (Wiedemann, 1824), Philippines; *luteinervis* Meijere, 1908, Papua New Guinea, Solomons; *hackeri* Klöcker, 1924, Papua New Guinea; *noona* Lyneborg et Barkemeyer, 2005, Papua New Guinea (New Ireland); *oceanica* Macquart, 1855, throughout Indomalayan Region, New Guinea, Australia, Solomons, Hawaii, Society and Marquesas, Micronesia, Hawaii; *orientalis* Macquart, 1842, throughout Indomalayan Region, Solomons, Australia, Micronesia, New Caledonia, Hawaii; *papua* Lyneborg et Barkemeyer, 2005, Papua New Guinea; *polita* Lyneborg et Barkemeyer, 2005, Papua New Guinea (New Britain)].

***Tigridemyia* Bigot, 1882** (Eristalinae) is here treated as a subgenus of *Mallota*. The group contains four species, one of which occurs in the Philippines (*curvigaster* (Macquart, 1842)).

***Triglyphus* Loew, 1840** (Pipizinae) is a small genus distributed from the Palaearctic south through the Indomalayan Region to Australia. There are eight known species, but many undescribed species from Australia (at least 12), Indomalaya (three) and New Guinea (one).

***Volucella* Geoffroy, 1762** (Eristalinae) is mainly a north temperate group (47 total species) absent from the Afrotropical, Australian and Neotropical Regions. Two species are known from the Philippines [*flavolinea* Hull, 1943 and *nitidithorax* Hull, 1941].

***Xanthandrus* Verrall, 1901** (Syrphinae) is a nearly cosmopolitan genus of 29 described species, absent only from New Zealand. There are five species from PSWNG [*bergmani* Doesburg, 1966, New Guinea; *bicinctus* (Meijere, 1929), Indonesia (Central Moluccas: Buru); *orientalis* Sack, 1926, Philippines; and two undescribed species from Philippines and New Guinea].

***Xanthogramma* Schiner, 1860** (Syrphinae) While a species of this genus is listed from the Philippines in the Oriental Diptera catalog (Knutson et al. 1975: 320), it does not occur in the Indomalayan Region. The species, *calceata* Sack, 1926 belongs to *Citrogramma* (**comb. nov.**), but was unfortunately overlooked in the recent revision of that genus (Mengual 2012).

***Xylota* Meigen, 1822** (Eristalinae) is largely a north temperate group (132 species), but does extend into PSWNG, where six species are known [*aeneimaculata* Meijere, 1908, Indonesia (West Papua); *coeruleopicta* Hippa, 1978, Indonesia (North Moluccas: Halmahera); *conformis* Walker, 1857, Malaya, Philippines; *iriana* Hippa, 1978, New Guinea; *novaeguineae* Hippa, 1978, New Guinea; *philippinica* Mutin et Gilbert, 1999, Philippines]. Hippa (1978) placed these species into two species groups (*aeneimaculata* and *pendleburyi* groups).

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Taxonomic and biogeographic revision of the New Guinean genus *Ophiotettix* Walker, 1871 (Tetrigidae: Metrodorinae: Ophiotettigini trib. nov.), with the descriptions of 33 new species

JOSEF TUMBRINCK [1] & **JOSIP SKEJO** [2]

1 – Auf der Hees 1, D-41849, Wassenberg, Germany; e-mail: j.tumbrinck@t-online.de
2 – University of Zagreb, Faculty of Science, Department of Biology, Division of Zoology, Evolution Laboratory, Rooseveltov trg 6, HR-10000, Zagreb, Croatia; e-mail: josip.skejo@biol.pmf.hr

Abstract: Long-headed pygmy grasshoppers (genus *Ophiotettix* Walker, 1871) from the New Guinean region (New Guinea and adjacent islands) are taxonomically and biogeographically reviewed. For *Ophiotettix* and the morphologically similar genera *Paraspartolus* Günther, 1939, *Spartolus* Stål, 1877 and *Threciscus* Bolívar, 1887 a new tribe is erected, Ophiotettigini trib. nov. This tribe is close to Clinophaestini Storozhenko, 2013, which is placed here also under Metrodorinae. Bufonidinae syn. rev. are regarded to be synonymous with Batrachideinae, not Cladonotinae, as previously considered. Statuses of currently known taxa of *Ophiotettix* are reviewed. The genus now includes 40 species, seven of them previously described: *O. buergersi* Bolívar, 1929, *O. cygnicollis* Walker, 1871, *O. limosina* (Snellen van Vollenhoven, 1865), *O. lorentzi* Bolívar, 1929, *O. modesta* Bolívar, 1929 stat. rev., *O. scolopax* Bolívar, 1929, *O. westwoodi* Bolívar, 1929 stat. rev. 33 new species are described and illustrated, namely: *O. amberiana* sp. nov., *O. bewana* sp. nov., *O. bomberaiensis* sp. nov., *O. brevicollis* sp. nov., *O. cheesmanae* sp. nov., *O. depressa* sp. nov., *O. filiforma* sp. nov., *O. flyriveriensis* sp. nov., *O. fritzpahli* sp. nov., *O. hansscholteni* sp. nov., *O. imbiana* sp. nov., *O. kaitani* sp. nov., *O. karimuiensis* sp. nov., *O. katharinae* sp. nov., *O. luce* sp. nov., *O. meggy* sp. nov., *O. mountnokensis* sp. nov., *O. parvicollis* sp. nov., *O. projecta* sp. nov., *O. pulcherrima* sp. nov., *O. pushkari* sp. nov., *O. quateorum* sp. nov., *O. rebrinae* sp. nov., *O. roesleri* sp. nov., *O. rohwedderi* sp. nov., *O. sanguinea* sp. nov., *O. schapinae* sp. nov., *O. stallei* sp. nov., *O. storozhenkoi* sp. nov., *O. subbrevicollis* sp. nov., *O. telefominensis* sp. nov., *O. tenuis* sp. nov., and *O. toxopei* sp. nov. An annotated identification key to species is provided. Antennal morphology (especially morphology of five apical segments) is diagnostically important in the taxonomy of this group and provides the best morphological character for species delimitation. Function of modified antennae is not fully understood. Differences between species exist also in head morphology, facial colouration, and morphometrics. Pygmy Giraffhoppers are a diverse group occupying most biogeographical regions of New Guinea North of the Central range, while only few species inhabit areas south of the central range.

Key words: Orthoptera, Tetrigidae, pygmy grasshoppers, Discotettiginae, New Guinea, taxonomy, new species, widened antennal segments, long head, horn.

Introduction

Pygmy grasshoppers (family Tetrigidae), an old lineage of Triassic origin, are one of the most diverse living Orthoptera groups, with more than 1900 species described to date (Song et al. 2015). The highest concentration of species is found in tropical regions, but there are representatives in all biogeographical realms, from taiga to tropical rainforests, exception being Antarctica and New Zealand (Tumbrinck 2014a). Pygmy grasshoppers can be easily recognized by their small body size (usually smaller than 1.5 cm), their pronotum being extended covering the abdomen, lack of tympana, lack of arolium between the claws, the tarsal formula being 2-2-3 and first thoracic sternum modified into a collar-like structure called sternomentum (Skejo 2016).

The island of New Guinea including its adjacent satellite islands like Gebe, Waigeo and Yapen has a very diverse pygmy grasshopper fauna. Species inhabiting this region show an extremely large variability of morphological structures like antennae, head, palpi, pronotum, legs and abdomen as well as a high number of endemic taxa. Hitherto about 30 genera and 100 species were recorded from





New Guinea (Tumbrinck 2014a, 2014b, 2015; Cigliano et al. 2017).

One of the morphologically most striking and interesting groups of pygmy grasshoppers is the genus *Ophiotettix* Walker, 1871 (formerly known also as *Tetricodina* Westwood, 1874 and *Tettigodina* Bolívar, 1887). It consists of colourful long headed pygmy grasshoppers that, out of endearment, could be named 'Pygmy Giraffehoppers'. In the past the genus had been assigned both to Discotettiginae (Hancock 1907) based on the presence of widened subapical antennal segments in certain species (e.g. *O. cygnicollis* Walker, 1871, the type species of the genus) and to Metrodorinae (e.g. Günther 1939) based on morphological similarity *Paraspartolus* Günther, 1939, *Spartolus* Stål, 1877 and *Threciscus* Bolívar, 1887 but is currently without clear placement within Tetrigidae.

Only two *Ophiotettix* species (*O. limosina* and *O cygnicollis*) had been described when Bolívar (1929) made the first revision of the genus, describing three additional species (*O. buergersi, O. lorentzi* and *O. scolopax*) and two subspecies (*O. buergersi modesta* and *O. b. westwoodi*). Since Bolívar's revision, Günther (1938a, 1939, 1955) added new localities for certain species, included *Ophiotettix* in his identification key and discussed the taxonomic position of the genus, but did not describe new taxa or change the status of any of the taxa described by then.

Based on the examination of over 750 specimens the current study, while re-evaluating the status of the described species, resulted in the recognition and description of an additional 33 new species. One possible new species photographed by various Orthopterologists in the Muller Range (Papua New Guinea) is not described here because of lack of physical specimens. Results from the current study were compared with previous studies dealing with morphology of *Ophiotettix* (especially Bolívar 1887, 1929; Hancock 1907; Günther 1939). The current study resulted in a new diagnosis of the genus and a more detailed description of members of the genus *Ophiotettix*, including characters previously used as well as numerous characters not yet used in detail until now. In addition the current study led to a detailed generic description with notes on variability of characters and with comments on value / usefulness of certain characters in this group of pygmy grasshoppers. An identification key to all known species is provided. In addition *Ophiotettix* is compared with morphologically similar genera in the Metrodorinae and the morphological diversity in particular of the antennae is discussed.

Materials and methods

Material

This study has been based on an examination of the majority of the hitherto published specimens besides a large number of additional specimens (altogether over 750 specimens). All specimens that arelisted have been examined unless stated otherwise. Paratypes have been individually numbered (3/14: paratype number 3 in a series of 14). Abbreviations used for depositories are presented below. Original label data are supplemented with authors' comments in square brackets.

Photography

Various cameras using various lenses have been used to take photos, all in macro mode by using a stacking system with integrated scale bar or with a macro-lens and millimetre paper. No post-processing of photographs has been done. Millimetre paper was placed close to photographed specimen and subsequently used to construct a scale bar included in the photograph, after which the millimetre paper was deleted.

Morphology

The morphology of head, pronotum, legs, and genitalia follows Devriese (1991, 1999) and Tumbrinck (2014a) (Plate 104 figs 1-4).

Results from the current study were compared with previous studies dealing with morphology of *Ophiotettix* (Bolívar 1887, 1929; Hancock 1907; Günther 1939). The current study resulted in a new diagnosis of the genus and a more detailed description of members of the genus *Ophiotettix*, including characters previously used as well as numerous characters not yet used in detail until now. In addition the current study led to a detailed generic description with notes on variability of characters and with comments on value/ usefulness of certain characters in this group of pygmy grasshoppers. Characters important for distinction of hitherto described species are related to head morphology and to morphometrics, thus for the genus a detailed morphological description is presented, while for each species, only diagnostic descriptions of the characters essential for accurate identification are presented.

Antennal morphology is the most relevant character in separation of *Ophiotettix* species.






Different ratios are important (e.g. length of two apical segments – segments 14+15 in ♀♀, 13+14 in ♂♂ compared to length of third segment from the tip – segment 13 in ♀♀, 12 in ♂♂), measurements of segments (e.g. comparison of width of third and sixth antennal segment from the tip), colouration (if three apical segments are white and strongly contrasting with the rest or if they are dark, do they bear silver bristles), and especially morphology of third, fourth and fifth antennal segments from the tip (are their inner and outer margins lamellate, strongly compressed, do they bear projecting edges or spines).

The colouration of specimens including that of antenna changes after fixation, bright colours (white, yellow, orange) usually becoming dark. For the description of the colouration of certain species photos from social networks (e.g. Flickr, Facebook) have been used after the identification had been confirmed. Variability of all the body parts in colouration is very high in the genus and colours may have high diagnostic value, since it seems that members of this genus are very visually-oriented grasshoppers.

Names for antennal segments were assigned as follows: 1st scapus, 2nd pedicel, 3rd-7th (female) or 3rd-6th (male) basal segments, 8th-9th (female) or 7th-8th (male) central segments, 10th-12th (female) or 9th-11th (male) subapical segments, 13th-15th (female) or 12th-14th (male) apical segments. Numeration of the antennal segments follows Kuřavova et al. (2017).

Measurements (Plate 104 figs 1-4)

Measurements were taken according to Tumbrinck (2014a) including also three additional measurements which are specifically helpful in *Ophiotettix* as follows:

Pronotum length: length of pronotum (dorsal or lateral view; dorsal view is more accurate) between the anterior and posterior margin (or apex).

Pronotum width: width of pronotum (dorsal view) between the apices of the lateral lobes of the pronotum (or their ventrolateral projections).

Pronotum height: height of pronotum (lateral view) from the ventral margin of the lateral lobes up to the dorsal margin of the pronotum above.

Hind femur length: length of hind femur (lateral view) from the tip of the dorso-basal lobe to the tip of the knee (including the geniculartooth).

Hind femur width: greatest width of hind femur (lateral view) between the ventral and dorsal margin.

Vertex width: width of vertex (dorsal view) between the hind margins of the lateral carinae of the vertex including the carinae.

Eye width: greatest width of an eye (dorsal view) from the outer side of the hind margins of the lateral carinae of the vertex and the perpendicular along the outer margin of the eye.

(I) Additional measurement: antennal length as length of the flagellum including scapus and pedicel.

(II) Additional measurement: head length in lateral view from the dorsal margin of the eyes to the ventral margin of the gena (Plate 104 fig. 1).

(III) Additional measurement: head index: length of the neck (part of the head below the compound eye) versus eye height in lateral view taken parallel to neck's extension (Plate 104 fig. 1).

Mapping

For mapping purposes coordinates were assigned to those localities for which only the locality names were available. To assign coordinates Google Earth, Google Maps and various hard copy maps have been used (including maps from collectors' expeditions). Coordinates assigned to localities are given in square brackets.

Acronyms for scientific collections used in the text:

AMS – Australian Museum, Sydney, New South Wales, Australia;

ANIC – Australian National Insect Collection, CSIRO, Canberra City, Australian Capital Territory, Australia;

ANSP – Academy of Natural Sciences, Philadelphia, Pennsylvania, U.S.A.;

BMEC – Bohart Museum Entomology Collection, Davis, California, U.S.A.;

BMNH – The Natural History Museum, formerly British Museum (Natural History), London, United Kingdom;

BPBM – Bernice P. Bishop Museum, Honolulu, Hawaii, U.S.A.;

BYUC – Monte L. Bean Life Science Museum, Brigham Young University, Provo, Utah, U.S.A.;

HNHM – Hungarian Natural History Museum, Budapest, Hungary;

IRSNB – Institut Royal des Sciences Naturelles de Belgique, Bruxelles, Belgique;

MFN – Zoologisches Museum der Humboldt Universität, currently Museum für Naturkunde der Humboldt-Universität zu Berlin, Germany;

MNCN – Museo Nacional de Ciencias Naturales, Madrid, Spain;





MNSL – Naturkundemuseum Leipzig, Germany;
MSNG – Museo Civico di Storia Naturale "Giacomo Doria", Genova, Italy;
NCB-RMNH – Nederlands Centrum voor Biodiversiteit (Dutch Centre for Biodiversity, formerly Nationaal Natuurhistorisch Museum Naturalis), Leiden, The Netherlands;
NME – Naturkundemuseum Erfurt, Germany;
OUMNH – University Museum of Natural History, Oxford, United Kingdom;
PERC – Purdue Entomological Research Collection, West Lafayette, Indiana, U.S.A.;
SMTD – Senckenberg Naturhistorische Sammlungen Dresden, Germany;
ZFMK – Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany
ZSM – Zoologische Staatssammlung, Munich, Germany;
TELNOV – Private collection Dmitry Telnov, Rīga, Latvia;
TUMBRINCK – Private collection Josef Tumbrinck, Wassenberg, Germany.

Results

Placement of *Ophiotettix* in Tetrigidae

Since establishment of the basis for the current Tetrigoidea taxonomy by Bolívar in 1887, not a lot has changed. After 1887 only few new subfamilies and tribes were established (e.g. Discotettiginae, Bufonidinae), serving primarily for better identification and not being evolutionary units. The only exception is subfamily Batrachideinae that can be regarded separate family Batrachideidae. Strong synapomorphies of the (sub)family are (1) female spermatheca with two diverticula (shared by all the members after Grant (1962), (2) rectangular paranota (shared by all the members except *Ascetotettix* Grant, 1956), (3) sulcate dorsal margin of the fore and mid femora, (4) antennae with more than 20 segments (except for certain brachypronotal genera, such as *Vingselina* Sjöstedt, 1921*, Ascetotettix*), (5) projected frontal margin of the pronotum (except in certain genera, e.g. *Paurotarsus* Hancock, 1900*,* certain *Tettigidea* Scudder, 1862 species) and (6) fastigium of the vertex convex and slightly projected above the compound eyes. Despite of recent placement of *Bufonides* Bolívar, 1898 within Cladonotinae, we assign the genus here to Batrachideinae, based on all the above presented statements (the only anatomical feature we did not examine is if *Bufonides* spp. possess two diverticula in female spermatheca). Other members of brachypterous Batrachideins from the Australian biogeographical region also have bifurcation of the frontal costa positioned lower than other Batrachideinae and scutellum very wide (genera *Wiemersiella* Tumbrinck, 2014b, *Vingselina* Sjöstedt, 1921).

Currently recognized subfamilies within the Tetrigoidea are (1) Batrachideinae (with Bufonidinae syn. rev. being synonymous with Batrachideinae rather than Cladonotinae), (2) Cladonotinae (including the tribe Xerophyllini), (3) Lophotettiginae (monotypic, only genus *Lophotettix* Hancock, 1909), (4) Metrodorinae (including tribes Cleostratini, and Amorphopini), (5) Scelimeninae (including tribes Criotettigini, Scelimenini, and Thoradontini), (6) Tetriginae (including tribes Dinotettigini, and Tetrigini), (7) Tripetalocerinae (including two tribes, Tripetalocerini, and Clinophaestini, but only 4 species altogether) and 10 genera without placement in any of the subfamilies (Cigliano et al. 2017).

The genus *Ophiotettix* is one of the nomenclaturally oldest Tetrigidae genera, only twelve genera being described before it. It is the very first endemic genus of New Guinea to be described. Morphologically *Ophiotettix* is one of the most striking genera of pygmy grasshoppers. Up to now *Ophiotettix* was assigned to the Discotettiginae. However Discotettiginae are identical with Scelimeninae (Skejo, Pushkar & Tumbrinck in press). *Ophiotettix* does not belong to Scelimeninae. Genera such as *Discotettix* Costa, 1864*, Gavialidium* Saussure, 1862*, Paragavialidium* Zheng, 1994, and *Kraengia* Bolívar, 1909 are characterized by tuberculated body, the vertex being significantly wider than a compound eye, with tuberculated lateral and median carina, the antennal grooves situated below the compound eyes, a wide scutellum, the head not being elongated with short occipital area and toothed fore, mid and hind femora. On the other hand, *Ophiotettix* shares numerous morphological characters with the genera *Spartolus* Stål, 1877*, Paraspartolus* Günther, 1939*, Threciscus* Bolívar, 1887 and thus the genus is placed here within Metrodorinae. Comparison to other genera is given in the generic diagnosis. This group can be easily characterized by a few strong morphological synapomorphies – (1) elongated head, (2) narrow (almost not visible) scutellum, (3) high position of the antennal grooves, (4) wings not visible, (5) apex of the pronotum sharp and directed somewhat upwards and (6) distal segment of the palpi pennate.






Subfamily Metrodorinae Bolívar, 1887

Type genus: *Metrodora* Bolívar, 1887 (Central and South America)

Type species: *M. rana* Bolívar, 1887 (type locality: Peru, Alto Amazonas)

Composition: The subfamily Metrodorinae includes two tribes, the Amorphopini Günther, 1939 with 3 genera and 8 species; the Cleostratini Bolívar, 1887 (sensu Storozhenko 2016) with 16 genera and 48 species) and another 71 genera with more than 540 species (Cigliano et al. 2017) without tribal placement. Of those, the tribe Ophiotettigini trib. nov. is erected for *Ophiotettix, Spartolus, Paraspartolus*, and *Threciscus*.

Distribution: Across all continents except Europe and Antarctica. Africa including Madagascar (22 genera, 85 species), North America (1 genus, 1 species), South America (15 genera, 78 species.), temperate Asia (20 genera, 216 species), tropical Asia including Malesia, Melanesia and Papuasia (42 genera, 163 species), Australia (2 genera, 3 species) (Skejo 2016).

Diagnosis: characterized by having the median ocellus and the antenna placed below the eyes, a relatively small divergence of the rami of the frontal costa not forming a wide scutellum, and a similar length of the first and third segments of the hind tarsus (Pavón-Gonzalo et al. 2012). Many species of Metrodorinae also exhibit the posterior angles of the lateral lobes of the pronotum produced outwards (the main character used when the subfamily was established) often becoming acutely spinose. All these characters together separate the subfamily from the other eight subfamilies of Tetrigidae, although none of them is enough to characterize Metrodorinae by itself.

Tribe **Ophiotettigini trib. nov**.

Type genus: *Ophiotettix* Walker, 1871 (New Guinea and adjacent islands)

Type species: *O. cygnicollis* (type locality: NW New Guinea: Dorei)

Derivatio nominis: The tribe is named after the genus *Ophiotettix*.

Composition: 4 genera have been assigned to the Ophiotettigini, *Ophiotettix with* 40 species, *Paraspartolus* with 1 species, S*partolus* with 2 species and *Threciscus* with 1 species

Distribution: Distributed across New Guinea and its satellite islands (*Ophiotettix*) and the Philippines (*Paraspartolus*, *Spartolus* and *Threciscus)*.

Diagnostic characters Ophiotettigini: Head – Head very elongated, occipital area very long, eyes pointed and produced above the vertex so the vertex is not visible in lateral view. Vertex extremely narrow, visibly narrower than a compound eye, not produced in front of the eyes, slightly tapering, not truncated, its median carina long and distinct, the lateral carinae low almost indistinct. Fossullae absent, the bifurcation of the frontal costa between the eyes indistinct because of an extremely narrow, indistinct scutellum. Antennae long and 14 (male) - 15 (female) segmented, the dorsal margin of the antennal groove slightly above the ventral margin of the compound eye. Between the eyes lateral ocelli are present. Thorax – Tegmina and wings not evident. Pronotum smooth, covered by numerous fine pits, the anterior margin truncated, apex slightly decurved upwards, the prozona slightly elevated in comparison to other parts of the pronotum, prozonal carinae evident, median carina weak, but present across the whole length of the pronotum, humeral angle widely oblique without depressions, lateral lobe triangularly shaped, projected outwards. Fore and mid femora carinated dorsally, slender, and smooth. Hind femora elongated, smooth, with evident transversal carinae in the external area, genicular tooth strong, antigenicular tooth weak, indistinct. Abdomen – ovipositor elongated.

Comparative notes of the included genera: In the description above we presented shared characters. Genera of the tribe Ophiotettigini can be distinguished by size (*Paraspartolus* smaller than 9 mm, while members of other genera being longer than 12 mm), colouration (*Paraspartolus* being greyish-brownish in colour, while members of other genera colourful, with red, yellow, orange, white, and dark tones), maxillar palpi morphology (having very widened, folliaceous last segment in *Ophiotettix,* and *Spartolus*, while not modified in *Paraspartolus* and *Threciscus*), pronotum morphology (brachypronotal in *Paraspartolus*, not covering whole abdomen, in *Ophiotettix* usually covering or almost covering whole abdomen, and covering whole abdomen in *Spartolus,* and *Threciscus*), morphology of the lateral lobes (with strong spines in *Spartolus* and *Threciscus*, without projections in *Paraspartolus,* while broadly acute in *Ophiotettix*).

Notes for the further research on the taxonomy of the tribe: Recent changes in Metrodorinae taxonomy (Cadena-Castañeda & Cardona 2015; Storozhenko 2016) gave a new view on the taxonomy of genera with projected frons, or fastigium of the vertex (tribes Cleostratini or Miriatrini - pygmy unicorns). However, certain





pygmy unicorns should probably be assigned to Ophiotettigini. These are (1) *Rhopalotettix vietnamensis* Storozhenko, 2015, which is very distant from other *Rhopalotettix* in having head significantly exerted above the pronotal surface, not in the lever or slightly exerted, antennae are 15-segmented, not 13-segmented as other species, evident median carina of the vertex, not depressed vertex as in other species, very exerted eyes, not 'sessile' as in other members of the genus, and extremely narrow scutellum, not evident as in other species, (2) *Halmahera nana* Storozhenko, 2016, brachypronotal taxon from Halmahera Isl. with projected vertex, but also strongly exerted head, pointed eyes, extremely narrow scutellum, long median carina of the vertex, pointed and slightly upwards curved apex of the pronotum, and elongated legs. There are also morphological similarities with *Hirrius punctatus* (Stål, 1877) and relatives (morphology of the pronotum, however there are numerous differences in head morphology, especially not elongated general appearance, and wide vertex), formerly Discotettiginae member whose taxonomic position is still not clear. Cladistic analysis is necessary to test which groups of Tetrigidae are the closest relatives to members of this morphologically specialized group. Furthermore, taxa of future taxonomic revision are *Thyrsus tiaratus Bol*ívar, 1887 and *Uvarovithrysus uvarovi* (Günther, 1935), the head morphology of which fits Ophiotettigini description. Better diagnoses and descriptions of pygmy unicorns' genera and species are needed in future because the former tribes combine taxa with very different morphology. A character shared by Ophiotettigini and the mentioned pygmy unicorn genera is a low position of the median ocellus. This character and its taxonomic importance will be investigated in future (for comments on taxonomy of pygmy unicorns consult Silva et al. (2017)). We place *Halmahera, Uvarovithrysus* and *Rhopalotettix* preliminary into Ophiotettigini trib. nov., because those taxa are certainly more related to *Ophiotettix* - like genera than to *Cleostratus* (this is one of the re-arrangement acts for genera hitherto placed in Cleostratini, see Cigliano et al. 2017, Orthoptera species file. Tribe Ophiotettigini is close to the tribe Clinophaestini Storozhenko, 2013 (members are genera *Birmana* Brunner von Wattenwyl, 1893 and *Clinophaestus* Storozhenko, 2013, which seem to be synonymous after our preliminary examination of *Birmana* and *Clinophaestus* specimens). This tribe is morphologically not related to Tripetalocerini, thus we move it to Metrodorinae: Clinophaestini. In future, well defined Clinophaestini and Ophiotettigini trib. nov. could together form tribes of a subfamily different from Metrodorinae, because they are very distantly related to *Metrodora*-genera group in S America. Clinophaestini members have prolonged fastigium of the vertex in the same way as nymphs in *Ophiotettix*, antennal edges have very similar shape. The number of the antennal segments is different - 11 in Clinophaestini. Shape of antennal segments is similar to some *Ophiotettix* species, the main difference being that there are five extremely widened antennal segments that have very lamellate inner margin and have the distal inner tip protruded into sharp edge, long tip, or spine. Nymphs usually have smaller number of antennal segments than fully grown adults and this implies a neotenic origin. All these characters make it evident how related to Ophitettigini they are.

Genus *Ophiotettix* Walker, 1871

Historical revision:

1871, *Ophiotettix*, Walker, Cat. Spec. Derm. Salt., part V: 846 (original description of the genus, and original description of *O. cygnicollis*);

1874, *Tetricodina*, Westwood,Thesaurus entomologicus Oxoniensis xxiv: 175 (original description, and original description of *T. luteomarginata*, description of *T. limosina*);

1887, *Tettigodina*, Bolívar, Ann. Soc. Entomol. Belg. 31: 305 (description of the genus, no taxonomic acts);

1907, *Tettigodina*, Hancock, Gen. Ins. Orth. Tetr. 48: 8 (description of the genus);

1910, *Ophiotettix*, Kirby, Syn. Cat. Orth. 3: 3 (citation);

1910, *Tetricodina*, Kirby, Syn. Cat. Orth. 3: 3 (partim, formal synonymy of *Tetricodina/Tettigodina* with the name *Ophiotettix,* synonymy of *O. limosina* and *O. luteomarginata*);

1929, *Ophiotettix*, Bolívar, Memorias de la Real Sociedad Espanola de Historia Natural, 15: 881-883 (revisionary monograph on the genus, detailed description of the genus and all the species: *O. limosina, O. cygnicollis*, and original descriptions of *O. buergersi buergersi, O. b. modesta, O. b. westwoodi, O. lorentzi,* and *O. scolopax*);

1937, *Ophiotettix*, Günther, Treubia, 16: 165: 168-175 (genus included in the key);

1938, *Ophiotettix*, Günther Nova Guinea. N.S. 2: 3-4 (new data);

1939, *Ophiotettix,* Günther, Abh. Ber. Mus. Tierkunde u. Völkerknde Dresden (A) 20: 21-35 (description of the genus, discussion on taxonomy of the genus);

1955, *Ophiotettix* Günther, Verh. Naturf. Ges. Basel, 66 (2): 167-172 (genus included in the key);

1970a, *Ophiotettix* Steinmann, Acta Zoologica Academiae Scientarum Hungaricae 16 (1, 2): 226 (citation);

1970b, *Ophiotettix* Steinmann, Opusc. Zool. Budapest 10 (1): 159 (citation);

1992, *Ophiotettix* Blackith, Tetrigidae of South-East Asia:






127 (citation);
1996, *Ophiotettix*, Yin et al., Synonymic catalogue grasshoppers of the world: 890 (citation);
1996, *Tetricodina*, Yin et al., Synonymic catalogue grasshoppers of the world: 890 (citation);
1997, *Ophiotettix*, Otte, Orthoptera Species File 6: 53 (citation).

Type species: *Ophiotettix cygnicollis* Walker, 1871 by original monotypy
Derivatio nominis: *Ophiotettix* has derived from the Ancient Greek words ´οφις (*ophis*, meaning snake or serpent) referring to elongated head and τέττιξ (*tettix*, meaning grasshopper or cicada).
Description: Head - Head elongated, the head index varying from <1 (in *O. parvicollis* sp. nov.) to >3 (longest in *O. scolopax*), fastigium generally obliquely rounded or obliquely angular, flat or deep (= concave), anterior border a little bit tapering, not truncated, sometimes slightly projected before the eyes in adults forming small horn, transverse carinae diagonal to the median carina, bulging, lateral carina weakly elevated, indistinct, in some species almost absent, in other species present and running parallel, divergent and convergent towards the tip. Vertex slightly flattened or deep (concave), with a concave part between the median carina and the eyes in some species, visibly narrower than a compound eye in dorsal and lateral view, the medial carina slightly elevated, in some species visible over the eyes in lateral view; from the middle of the eye to the frontal part of the fastigium higher; from the middle of the eye length to the anterior tip of the pronotum visible as a fissure. Fossullae absent or extremely reduced, not visible. Frontal costa in lateral view strongly arched, projected before the eyes, from between the lateral ocelli to the median ocellus, the bifurcation between the eyes and between the lateral ocelli, in frontal view extremely narrow, the scutellum so narrow that it seems that there is no bifurcation, ending at the medial ocellus, under the medial ocellus visible as bright stripe or fissure. Superior (lateral or paired) ocelli situated a little above the middle of the eyes. Eyes suboval, slightly exerted, their dorsal margin extending a little above the fastigium situated at the tip of a long neck. Antennae very long, almost as long as whole body, 15-segmented in females, 14-segmented in males, the upper margin of the antennal grooves situated above the lower margin of the eyes. Thorax - Pronotum short (brachypronotal state), low and tectiform, undulated, covering whole or almost whole abdomen, discus smooth, covered with many fine, sunken dots. Anterior margin straight, truncated, but can vary and be a little bit extended in the middle (this feature is not significant identification character), no depressions behind the shoulders. Median carina very low, present as a light fissure over the whole pronotum. Prozona higher than the rest of the pronotum, as well as the part above the connection of hind femora. Prozonal carinae long, parallel, not elevated - two light, pale coloured fissures. Humeral angles inconspicuous, widely oblique, not armed. Interhumeral carinae low, but well visible as two bright stripes on the discus. Infrascapular area broad with a concave part above the connection of the hind femur, with numerous large pits (usually larger than those on the discus). Lateral lobes strongly curved laterad, broadly acute. Pronotal process extended in a spine, extremely narrow, not truncated, not inverted. Extralateral carina continuous to the sulci as bright stripe. Wings. Tegmina not visible (reduced and covered by pronotum), wings (= alae) not visible (reduced and covered by pronotum) - flightless species. Legs. Anterior femur very slender, smooth, not undulated, without lobes. Anterior tibia slender, elongated, armed with small spines from the mid of its length and further. Middle femur very slender, smooth, not undulated, without lobes, with a few hairs. Middle tibia slender, elongated, armed with small spines from the 1/3 of its length and distally. Hind femur very slender (more than 4x, in most species more than 6x longer than wide), without tubercles, with smooth and low transversal carinae in the external lateral area of the femoral. Dorso-external and ventro-external carina smooth, without projections. Hind tibia uniformly brown, not annulated with pale rings. Genicular tooth clearly visible, long and acute. Antegenicular tooth indistinct, very small, almost absent. First and third article of the hind tarsi almost equal in length. Pulvilli of the mid article of the hind tarsus obtuse, rounded, not sharp and pointed. Abdomen - Ovipositor elongated.
Comments on nymphal morphology. In nymphs of a lot of species fastigium is long and projected in earlier instars (depicted in Günther 1938b), decreasing in size with every moulting, as nymph grows. Long vertex in nymphs seems to be connected with head prolongation - practically during development eyes move higher and higher towards the tip of the vertex and the part above the eyes is becoming shorter and shorter. It is interesting that long vertex in nymphs (as well as in most Cleostratini) provides very good mimicry. Predator firstly thinks it is small branch or something elongated like that, and if it wants to strike, it will not be sure which is the head






tip and which is tip of the pronotum, giving nymphs of *Ophiotettix* and pygmy unicorns (Tetrigidae genera with prolonged vertex) time to jump and escape safely.

Generic diagnosis: See comparative notes under the tribe Ophiotettigini nov.

Colouration: Head usually dark, only in some species bright, tip of the fastigium often brightened, frons below the median ocellus and above the clypeus with highly complicated species specific colour markings varying from almost black or with a bow tie shaped pale marking above the clypeus to highly decorated with one or more markings above the clypeus, antennae completely black, dark-grey, or dark-brown, sometimes apical and subapical segments brightly coloured. Pronotum usually dark, (black, brown, grey, dark-brown, dark-grey), in some species bright, with very contrasting median carina (yellow, orange, reddish, or white), with a pale coloured region (orange, pale orange, white, yellow) of variable width between the internal and external lateral carinae running from the fore margin to the humeral angle and to the tip of the pronotum along the prozonal carinae, the area around the tip of the lateral lobe usually pale coloured, one coloured or a mixture of bright colours (e.g. white, orange, yellow). Fore and middle femur dark, occasionally with a pale stripe along the dorsal margin. Fore and middle tibia dark, the proximal tarsal segments often pale coloured, the distal ones dark with a pale coloured dorsal margin. Hind femur completely dark, or dark with the area above the dorso-external carina and below the ventro-external carina with a narrow to wide white stripe along the entire length. Hind tibia dark, the first tarsal segment usually bright, the second segment pale, the third segment dark, with a pale coloured dorsal margin.

Distribution (Map 1): The genus is currently known from New Guinea and some of its satellite islands (Yapen, Gebe and Waigeo) with most species found North of the Central Range Mts. Up to now there are no records from the adjoining Moluccas islands.

Composition: Altogether 40 species are now assigned to the genus *Ophiotettix*: 5 hitherto described species supplemented with two subspecies of *O. buergersi* (*O. buergersi modesta*, *O. buergersi wewstwoodi*) here elevated to the species level and 33 species described here as new to science). Species can be ordered into 12 groups according to morphological similarities as follows:

(1) 'Brevicollis' species group (Map 1): *O. brevicollis* sp. nov. (Short-neck Giraffehopper), *O. parvicollis* sp. nov. (Petite Giraffehopper), *O. roesleri* sp. nov. (Petite Rösler's Giraffehopper), *O. subbrevicollis* sp. nov. (Shortish-neck Giraffehopper)

Recognition: The four species of this group are characterised by short heads and the antennal segments without specialized broadly lamellate antennal segments

(2) 'Buergersi' species group (Map 1): *O. buergersi* (Bürgers' Giraffehopper), *O. imbiana* sp. nov. (Imbia Giraffehopper), *O. modesta* stat. rev. (Modest Giraffehopper), *O. rohwedderi* sp. nov. (Rohwedder's Giraffehopper), *O. sanguinea* sp. nov. (Bloody Giraffehopper), *O. schapinae* sp. nov. (Šapina's Giraffehopper), *O. tenuis* sp. nov. (Elegant Giraffehopper)

Recognition: This species group is heterogeneous, including seven species without pale apical segments that are strongly contrasting, with modified subapical antennal segments bearing lateral edges protruded into acute, right angle, or spine, fourth antennal usually bearing spine or protruded angle directed forwards, fifth antennal segment not modified or produced backwards or bearing small and low angular projection.

(3) 'Cygnicollis' species group (Map 1): *O. amberiana* sp. nov. (Amberi Giraffehopper), *O. cygnicollis* sp. nov. (Short-neck Pennate Giraffehopper), *O. pushkari* sp. nov. (Pushkar's Pennate Giraffehopper), *O. storozhenkoi* sp. nov. (Storozhenko's Pennate Giraffehopper)

Recognition: This group includes four species characterized by relatively long necks and extremely wide subapical antennal segments, third segment being 'cup'–like. General appearance dark, antennae dark. The group resembles both the 'Toxopei' species group and the 'Buergersi' species group.

(4) 'Hansscholteni' species group (Map 1): *O. hansscholteni* sp. nov. (Hans Scholten's Giraffehopper)

Recognition: This group includes only one species characterized by a long head, and elongated antennal segment with protruding edges. The species (group) is related to the 'Brevicollis' species group.

(5) 'Limosina' species group (Map 1): *O. bewana* sp. nov. (Bewani Giraffehopper), *O. bomberaiensis* sp. nov. (Onin Slender Giraffehopper), *O. depressa* sp. nov. (Depressed Slender Giraffehopper), *O. filiforma* sp. nov. (Lowland Slender Giraffehopper), *O. limosina (*Godwith Giraffehopper), *O. luce* sp. nov. (Luce's Giraffehopper), *O. mountnokensis* sp. nov. (Mount Nok Giraffehopper), *O. projecta* sp.






nov. (Excited Giraffehopper), *O. scolopax* (Giant Giraffehopper)

Recognition: A heterogeneous group of nine relatively long headed species with filiform antennae without pale tips lacking specialized segments. Resembles the 'Lorentzi', 'Pulcherrima' 'Brevicollis' and 'Buergersi' species groups likely to contain species with ancestral characters, from which more specialized, eastern forms derived.

(6) 'Lorentzi' species group (Map 1): *O. lorentzi* (Lorentz's Giraffehopper)

Recognition: This group includes only one species characterized by a long head and having third, fourth and fifth antennal segment from the tip widened and rounded. This species resembles the 'Katharinae' species group some characters being intermediate between species of the 'Limosina' and 'Toxopei' species group.

(7) 'Katharinae' species group (Map 1): *O. flyriveriensis* sp. nov. (Fly River Giraffehopper), *O. kaitani* sp. nov. (Kai Tan's Giraffehopper), *O. karimuiensis* sp. nov. (Karimui Giraffehopper), *O. katharinae* sp. nov. (Katharina's Giraffehopper), *O. quateorum* sp. nov. (Quate's Giraffehopper)

Recognition: The group consists of five species and is characterized by dark antennae, subapical segments with lamellate inner margins, third antennal segment from the tip without long protruded tip, fourth segment from the tip parallel or convergent towards the tip, fifth antennal segment from the tip with the dorsal margin straight or curved backward. In colouration, species of this group resemble those of the 'Brevicollis' species group and those two groups are probably closely related, likely also mixed.

(8) 'Pulcherrima' species group (Map 1): *O. pulcherrima* sp. nov. (Beautiful Giraffehopper), *O. rebrinae* sp. nov. (Rebrina's Giraffehopper)

Recognition: This group consists of two species with a colourful appearance characteristic by a long head, slender dark antennae with pale coloured, very contrasting apical segments. This group is probably related to some representatives of the 'Limosina'species group.

(9) 'Stallei' species group (Map 1): *O. stallei* sp. nov. (Stalle's Giraffehopper)

Recognition: This group includes only one species characterized by relatively short head (head index <1.25), projected fastigium (minute horn), antennae with segments widened towards the tip. The species shows nymphal characters and could be regarded as a neotenic species related to the 'Brevicollis' species group.

(10) 'Telefominensis' species group (Map 1): *O. telefominensis* sp. nov. (Telefomin Giraffehopper)

Recognition: This group includes only one species characterized by the fastigium distinctly protruded into a horn, the antennal segments not being specialized, with the margins widened towards the apex. The species has some nymphal characters, and could be regarded as a neotenic mountain species. Species with a protruding but less produced fastigium are found also in other species groups and it is not clear to which species (group) is this one related.

(11) 'Toxopei' species group (Map 1): *O. toxopei* sp. nov. (Toxopeus's Giraffehopper)

Recognition: This group includes only one species characterized by having the third antennal segment from the tip similarly widened as the fourth segment, both being broadly lamellate. This group is related to the 'Cygnicollis' species group.

(12) 'Westwoodi' species group (Map 1): *O. cheesmanae* sp. nov. (Cheesman's Giraffehopper), *O. fritzpahli* sp. nov. (Fritz Pahl's Giraffehopper), *O. meggy* sp. nov. (Meggy's Giraffehopper), *O. westwoodi* stat. rev. (Westwood's Giraffehopper)

Recognition: This group includes four species - three of which are characterized by pale apical antennal segments and at least one antennal segment with a protruding tip at the inner margin, the fourth antennal segment from the tip of the antennae. *O. fritzpahli* sp. nov. with morphological characters between the 'Westwoodi' and the 'Pulcherrima' species groups is tentatively placed in this group.

Identification key to *Ophiotettix* species

Species arranged taxonomically according to species groups proposed.

1 Apical antennal segments (segments 15+14 in ♀♀, 14+13 in ♂♂) completely or almost completely pale coloured (white to pale brown, clearly contrasting in colour from other antennal segments), clearly brighter than other antennal segments (e.g. plate 115 figs 7, 15, plate 107 fig. 6, plate 108 fig. 14, plate 123 fig. 1) 2

– Apical segments (segments 15+14 in ♀♀, 14+13 in ♂♂) as dark as the rest of the antennae or somewhat lighter (not having strong contrast in comparison to other segments) (e.g. plate 105 figs 1-6) 7

2 Third segment from the tip (13 in ♀♀, 12 in ♂♂) dark or with small bright distal portion (Plate 106 fig. 8, plate 108 fig. 14) 3

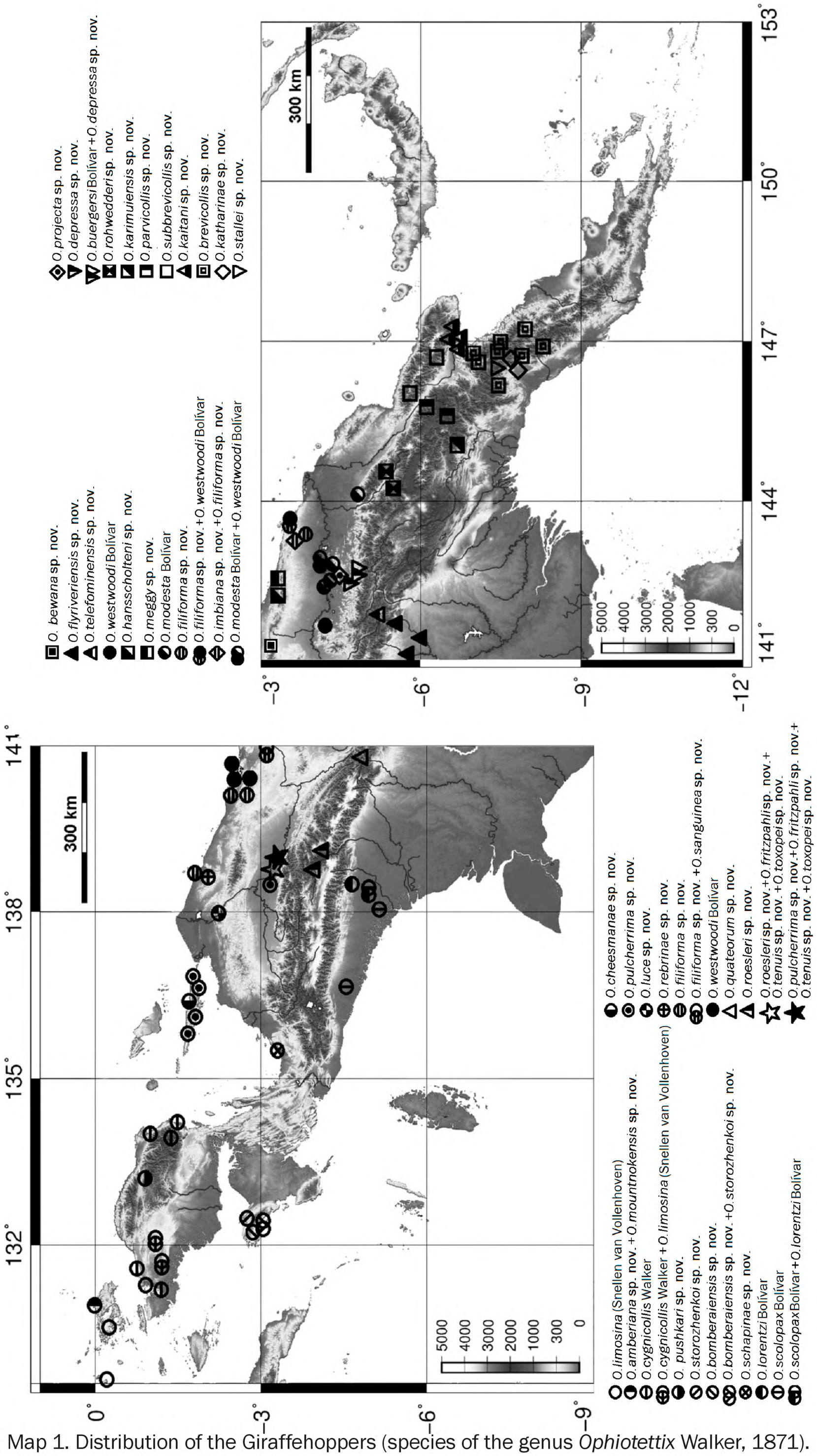
– Third segment from the tip (13 in ♀♀, 12 in ♂♂) bright to at least half of its length (Plate 105 figs 7, 14, 15, plate 106 fig. 14, plate 107 fig. 6, plate 123 figs 1, 3, 4) 4











Map 1. Distribution of the Giraffehoppers (species of the genus *Ophiotettix* Walker, 1871).
Every species is depicted by its unique symbol. Symbols are arranged by species' occurrence from west to east.



3 Two apical antennal segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together shorter than the third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂); inner margin of the fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) significantly broadened, pennate; sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) significantly broadened, its inner margin lamellate (Plate 108 fig. 14) [Papua New Guinea: East Sepik Province: Mäanderberg and Indonesian New Guinea: Cyclops Mts.] .... *O. westwoodi* stat. nov.
– Two apical antennal segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together longer than the third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂); inner margin of the fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) not significantly broadened; sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) slightly broadened, its inner margin not lamellate (Plate 106 fig. 8) [Papua New Guinea: West Sepik Province: Torricelli Mts.] .... *O. meggy* sp. nov.
4 Inner margin of the antennal segments only with one edge widened (on the first sight, antennae almost filiform, distinguishable from species with almost filiform antennae easily by white apices) (Plate 106 fig. 14, plate 107 fig. 6, plate 123 figs 1, 3, 4) 5
– Inner margin of the antennal segments clearly lamellate (antennal segments visibly broadened – pennate) (Plate 105 figs 7, 14, 15) 6
5 At most two–thirds of third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂) brightly coloured. Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) not brightened. First and second antennal segments from the tip (segments 14+15 in ♀♀, 13+14 in ♂♂) without silver bristles (Plate 107 fig. 6). Smaller species (head length in ♂♂ 4.25 mm, pronotum 8.2 mm, antennae 7.2 mm) (Plate 115 fig. 5, plate 119 fig. 5) [Indonesian New Guinea: upper north coast, east of Mamberamo River] ..... *O. rebrinae* sp. nov.
– At least two–thirds of third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂) brightly coloured. Fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂) pale coloured in the beginning. First and second antennal segments from the tip (segments 14+15 in ♀♀, 13+14 in ♂♂) with silver bristles (Plate 106 fig. 14, plate 123 figs 1, 3, 4). Larger species (head length in ♂♂ 5–6.4 mm, pronotum 8.3–9.4 mm, antennae 8.2–9.5 mm) (Plate 114 figs 14, 15, plate 118 figs 14, 15) [Indonesian New Guinea: Yapen and upper Mamberamo River] ..... *O. pulcherrima* sp. nov.
6 Whole third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂) bright. Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) with a lateral edge obliquely protruded, pale coloured in its distal part (Plate 105 figs 14, 15) [Indonesian New Guinea: upper Mamberamo River] ..... *O. fritzpahli* sp. nov.
– Distal two thirds of third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂) bright. Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) with a laterally protruding sharp tip, whole segment dark (Plate 105 fig. 7) [Indonesian New Guinea: Yapen, Mount Oud] ..... *O. cheesmanae* sp. nov.
7 Antennal segments elongated, antennae on the first sight filiform - segments rounded in cross section, or with very narrow edges (weakly lamellate), without laterally protruded tips (e.g. plate 105 figs 2-4, 8-11, plate 106 figs 7, 9, 10, 13) 8
– Antennae with modified segments – shortened, widened or compressed – one or more antennal segments broadened; at least one segment with laterally protruded tip (e.g. plate 105 figs 1, 5, 6, 12, 13, 16, plate 106 figs 1-6, 11, 12) 16
8 Not all the antennal segments rounded. At least fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) in cross–section with narrow, not rounded edges (different from plate 108 figs 8, 9, see e.g. plate 105 figs 2-4, 8, 9) 9
– All antennal segments rounded in cross–section (including segment 12 in ♀♀, 11 in ♂♂), with smooth margins (Plate 108 figs 8, 9). Additional helpful character: Head index <1.45) [Indonesian New Guinea: Gebe Isl. and from western Doberai Peninsula to the Arfak Mts.] ..... *O. limosina* (Snellen van Vollenhoven, 1865)
9 Head index from 1.3 to 2.5 (shorter neck) (head shorter than in plate 112 figs 16, 17 and plate 120 figs 14, 15, see e.g. plate 117 figs 3-5, 9-12) 10
– Head index >3.2 (extremely long neck; this is the species with the longest head) (Plate 104 fig. 1, plate 112 figs 16, 17, plate 120 figs 14, 15) [Indonesian New Guinea: Bivak Eiland, Noord River, Mimika River] .... *O. scolopax* Bolívar, 1929
10 Three apical antennal segments (segments 15+14+13 in ♀♀, 14+13+12 in ♂♂) as long as fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) (Plate 105 figs 8-11) 11
– Three apical antennal segments (segments 15+14+13 in ♀♀, 14+13+12 in ♂♂) longer than fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) 12
11 Head more elongated, head index 2.4 in ♀♀, in 1.9 in ♂♂. Two apical antennal segments (segments 15+14 in ♀♀, 14+13 in ♂♂) as long as third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂) (Plate 105 figs 10, 11). Vertex almost flat, lateral carinae, in lateral view, not visible above the eyes (Plate 109 figs 11, 12), tip of the fastigium not brightened (Plate 113 figs 11, 12) [Indonesian New Guinea and Papua New Guinea: lowland at the north coast] ..... *O. filiforma* sp. nov.
– Head less elongated, head index 1.2–1.7 in ♀♀, in 1.3 in ♂♂. Two apical antennal segments (segments 15+14 in ♀♀, 14+13 in ♂♂) shorter than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂) (Plate 105 figs 8, 9). Vertex deep, lateral carinae, in lateral view, visible above the eyes (Plate 109 figs 9, 10), tip of the fastigium brightened (Plate 113 figs 9, 10) [Papua New Guinea: East Sepik Province, Sepik River] .. .. *O. depressa* sp. nov.






12 Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂), slightly widened and with lamellate edge, significantly longer than fifth antennal segment from the tip (segment 11 in ♀♀, 10 in ♂♂), apical antennal segments (segments 15+14 in ♀♀, 14+13 in ♂♂) in some specimens with fine silver bristles. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) wider than third (segment 13 in ♀♀, 12 in ♂♂) (Plate 105 figs 3, 4) [Indonesian New Guinea: Onin Peninsula] .... *O. bomberaiensis* sp. nov.
– Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) shorter than fifth antennal segment from the tip (segment 11 in ♀♀, 10 in ♂♂), apical antennal segments (segments 15+14 in ♀♀, 14+13 in ♂♂) without silver bristles. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) approximately as wide than third (segment 13 in ♀♀, 12 in ♂♂) (e.g. Plate 105 fig. 2, plate 106 figs 7, 9, 10, 13) 13
13 Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) widened towards the tip and bearing widened inner margin with slightly protruded edge (Plate 106 fig. 7). Body almost lacking colouration (pale coloured), tip of the fastigium brighter in colour than rest, carinae of the pronotum somewhat darker than rest (Plate 110 fig. 7, plate 114 fig. 7, plate 118 fig. 7) [Indonesian New Guinea: lower Mamberamo River] .... *O. luce* sp. nov.
– Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) with parallel distal margins, not broadened towards the tip (Plate 105 fig. 2, plate 106 figs 9, 10, 13). Body dark in colouration, with pale markings on head, pronotal carinae and legs (Plate 117 fig. 3, plate 118 figs 9, 10, 13) 14
14 Head shorter, head index <1.6 (Plate 118 figs 9, 10). Vertex deep in frontal view (Plate 110 figs 9, 10). Tip of the fastigium brightened (Plate 114 figs 9, 10) [Indonesian New Guinea: Waigeo, Mount Nok] .... *O. mountnokensis* sp. nov.
– Head longer, head index >2 (Plate 117 fig. 3, plate 118 fig. 13). Vertex flat in frontal view (Plate 109 fig. 3, plate 110 fig. 13). Tip of the fastigium dark (Plate 113 fig. 3, plate 114 fig. 13) 15
15 Two apical antennal segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together as long as third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Apical antennal segments dark. Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) with a little protruding edge but not broadly lamellate. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) as broad as the third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂) (Plate 106 fig. 13). Lateral carinae of the vertex run parallel [Papua New Guinea: East Sepik Province, Sepik river] .... *O. projecta* sp. nov.
– Two apical antennal segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together shorter than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Apical segments one and the half of the second apical (segments14+15 in ♀♀, 13+14 in ♂♂) lighter brownish. Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) narrow, with no protruding edge at the inner dorsal margin. Fifth antennal segment from the tip (segment 11 in ♀♀, 10 in ♂♂) straight at the dorsal margin. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) smaller than the third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂) (Plate 105 fig. 2). Lateral carinae of the vertex convergent [Papua New Guinea: Sandaun Province, Bewani Mountains] .... *O. bewana* sp. nov.
16 Third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂) broadly lamellate, as broad as fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) (Plate 108 figs 3, 4) [Indonesian New Guinea: upper Mamberamo River] ..... *O. toxopei* sp. nov.
– Third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂) visibly smaller than fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂), not as broadly lamellate (e.g. plate 105 figs 1, 5, 6, 12, 13, 16) 17
17 Third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂) cup–shaped, in morphology similar to the fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂), but smaller, bearing distinct protruded long tip at the inner margin (Plate 105 fig. 1, plate 107 figs 1, 2, 13, 14, plate 108 figs 6, 7) 18
– Third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂) narrow and elongated, without distinct protruded long tip at the inner margin (e.g. plate 105 figs 5, 6, 12, 13, 17) 21
18 Third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂) as long as two apical antennal segments together (segments 15+14 in ♀♀, 14+13 in ♂♂), its inner margin of the segment with a protruding edge. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) widened, with recognizable edges (Plate 107 figs 1, 2, plate 108 figs 6, 7). Head shorter (head index in most specimens 1.18–1.35, seldom up to 1.45) (Plate 119 figs 1, 2, plate 120 figs 7, 8) 19
– Third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂) longer than two apical antennal segments together (segments 15+14 in ♀♀, 14+13 in ♂♂), its inner margin of the segment with a long spiky tip. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) elongated, without recognizable edges (Plate 105 fig. 1, plate 107 figs 13, 14). Head longer (head index more than 1.55, 1.55–2, rarely 1.48) 20
19 Fourth and fifth antennal segments from the tip (segments 11+12 in ♀♀, 10+11 in ♂♂) broadly rounded (about 3x wider than the second antennal segment from the tip - segment 14 in ♀♀, 13 in ♂♂), bearing long wide and protruding tip (Plate 108 figs 6, 7) [Indonesian New Guinea: Doberai Peninsula] .... *O. cygnicollis* Walker, 1871
– Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) elongated (about 2x as wide as the second antennal segment from the tip - segment 14 in ♀♀, 13 in ♂♂), bearing protruded distal angle, but not long protruding tip (Plate 107 figs 1, 2) [Indonesian New






Guinea: Doberai Peninsula, Kebar valley] .... *O. pushkari* sp. nov.
20 Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) shorter than three apical antennal segments together (segments 15+14+13 in ♀♀, 14+13+12 in ♂♂). Third antennal segment from the tip wider than the sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂). Two apical antennal segments without silver bristles (Plate 107 figs 13, 14). Fronts and clypeal region (frontal view of the head) dark (Plate 111 figs 15, 16), hind femora dark, without pale markings (Plate 119 figs 15, 16) [Indonesian New Guinea: Onin Peninsula] ..... *O. storozhenkoi* sp. nov.
– Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) longer than three apical antennal segments together (segments 15+14+13 in ♀♀, 14+13+12 in ♂♂). Two apical antenna segments bearing file silver bristles. Third antennal segment from the tip as wide as the sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) (Plate 105 fig. 1). Pale coloured bow–tie or moustache shaped mark present in frontal and clypeal region (frontal view of the head) (Plate 109 figs 1, 2), hind femora with pale markings (Plate 117 figs 1, 2) [Indonesian New Guinea: Waigeo] . ..... *O. amberiana* sp. nov.
21 Tip of the fastigium protruding before the eyes as long easily visible horn curved downwards (Plate 107 fig. 17), lateral carinae of the vertex little divergent to the tip of the fastigium. (Helpful additional characters: head short, head index 1.05, larger species in comparison to other species with small head index – pronotum length in male about 8 mm) (Plate 119 fig. 19) [Papua New Guinea: Western Province: Telefomin] .... *O. telefominensis* sp. nov.
– Tip of the fastigium not strongly protruded before the eyes (not as in plate 119 at most as in plate 107 fig. 7, 8, 12, normally as in e.g. plate 106 figs 3, 4) (if protruded then weak and short, see *O. parvicollis, O. roesleri, O. stallei, O. rohwedderi*), lateral carinae of the vertex parallel or convergent to the tip of the fastigium 22
22 Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) elongated, weakly widened, not strongly modified or pennate, with almost parallel edges. Additional helpful characters fifth and sixth antennal segments from the tip (segments 10+11 in ♀♀, 9+10 in ♂♂) elongated, slender, not widened (Plate 105 fig. 16). Large size, pronotum length 8–11 mm, long neck, head index 1.9–2.3 (Plate 117 figs 17, 18), other species with similar antennal morphology are smaller, have modified fourth antennal segment from the tip and short neck (see e.g. *O. parvicollis*, *O. brevicollis*, *O. subbrevicollis, O. roesleri*) [Papua New Guinea: West Sepik Province: Torricelli Mts.] ..... *O. hansscholteni* sp. nov.
– Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) compressed, widened, modified or pennate, with modified rather than parallel edges) (e.g. plate 105 figs 5, 6, plate 106 figs 1-6, 11, 12, plate 108 fig. 10) 23
23 Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) roundly widened, without projecting angle or spine (Plate 108 fig. 10). Helpful additional characters: third, fourth and the fifth antennal segment from the tip widened and rounded, neck long, head index 1.9–2.3, body large – pronotum length in ♀♀ 10–11.5 mm (Plate 120 fig. 11) [Indonesian New Guinea: Alkmaar and Bivak Eiland] ..... *O. lorentzi* Bolívar, 1929
– Fourth antennal segment from the tip bearing lateral angle or spine-like protrusion (e.g. plate 105 figs 5, 6, plate 106 figs 1-6, 11, 12) 24
24 Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) is the only segment with clear lateral angle or low spine, fifth antennal segment from the tip (segment 11 in ♀♀, 10 in ♂♂) almost not compressed, weakly lamellate and elongated, lacking protruded angle or spine (Plate 105 figs 5, 6, plate 106 figs 11, 12, plate 107 figs 7, 8, 15, 16) 25
– Fourth and fifth antennal segments from the tip (segments 11+12 in ♀♀, 10+11 in ♂♂) modified, bearing lateral edge protruded into acute, right angle, or spine, distal projection of the fifth segment directed forwards (as angle or spine) or backwards (on the first sight in some species looks like angular protrusion, but compare this case in e.g. *O. kaitani* where the protrusion is directed transversely on the antennae to protrusion case in e.g. *O. schapinae* where protrusion is directed towards the tip of the antenna) (Plate 106 fig. 1-6, plate 107 figs 9, 11, 12) 28
25 Head robust, head index very low (0.65–0.9 in ♀♀, 0.68 in ♂♂) (Plate 118 figs 11, 12). Additional helpful characters: vertex flat, tip of the fastigium projected forwards as minute horn (Plate 114 figs 11, 12), tip of the fastigium dark, small species – pronotum length 7.0–8.5 mm in ♀♀, 6 mm in ♂♂ respectively, this is species with the shortest neck [Papua New Guinea: Eastern Highlands Province: Kassem, Okapa, Aiyura] ... . *O. parvicollis* sp. nov.
– Head more elongated, head index higher (1.24–1.5 in ♀♀, 0.96–1.22 in ♂♂) (Plate 117 figs 6, 7, plate 119 figs 6, 7, 17, 18) 26
26 Vertex flat, tip of the fastigium dark (Plate 115 figs 6, 7), head index 1.24in ♀♀, 0.96 in ♂♂ respectively (Plate 119 figs 6, 7). Additional helpful characters: Small body size, <8 mm ♀♀, <6 mm in ♂♂ respectively. Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) with protruding edge, inner margin of the fifth antennal segment from the tip (segment 11 in ♀♀, 10 in ♂♂) weakly lamellate (Plate 107 figs 7, 8) [Indonesian New Guinea: Mountains south of Idenburg River] .... *O. roesleri* sp. nov.
– Vertex deep (Plate 109 figs 6, 7, plate 111 figs 17, 18), tip of the fastigium brightened (Plate 113 figs 6, 7, plate 115 figs 17,18), head index 1.28–1.5 in ♀♀, 1.19–1.22 in ♂♂ respectively. Additional helpful characters that can be checked: Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) with weak angular projection in its tip, fifth antennal segment from the tip (segment 11 in ♀♀, 10 in ♂♂) not modified 27






27 Two apical antennal segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together as long as the third antennal segment from the tip (segment 13 in ♀♀, 12in ♂♂), sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) widened towards the tip and bearing recognizable diverging edges (Plate 107 figs 15, 16). Pronotal carinae with weak, reddish colouration (Plate 115 figs 17, 18). Additional helpful character: head index 1.5 in ♀♀, 1.22 in ♂♂ respectively [Papua New Guinea: Madang and Morobe provinces: Finisterre and Saruwared Ranges] .. .. *O. subbrevicollis* sp. nov.
– Two apical antennal segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together slightly shorter than the third antennal segment from the tip (segment 13 in ♀♀, 12in ♂♂), sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) not widened but narrow, with parallel margins (Plate 105 figs 5, 6). Pronotal carinae with yellowish colouration (Plate 113 figs 6, 7). Additional helpful character: head index 1.28 in ♀♀, 1.19 in ♂♂ respectively. (Plate 117 figs 6, 7) [Papua New Guinea: Morobe Province: Kuper Range] .. *O. brevicollis* sp. nov.
28 Fourth and fifth antennal segments from the tip (segments 11+12 in ♀♀, 10+11 in ♂♂) both with inner distal margins projected into easily observable acute angles or spines directed forwards (Plate 105 figs 12, 13, plate 106 figs 1-6, plate 107 figs 3, 4, 12) 29
– Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) bearing spine or protruded angle directed forwards, fifth antennal segment not modified or produced backwards or bearing small and low angular projection (Plate 105 fig. 17, plate 107 fig. 9-11, plate 108 figs 1, 2, 5, 11, 12) 34
29 Head relatively short (head index 1.2 in ♂♂) (Plate 119 fig. 14). Tip of the fastigium slightly protruded before the eyes forming small horn (smaller in size than that of *O. telefominensis*) (Plate 115 fig. 14). Antennae in ♂♂ short – 5.33 mm in length. Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) widened towards the tip, its outer margin not curved (Plate 107 fig. 12). Additional helpful characters: Fifth antennal segment from the tip (segment 11 in ♀♀, 10 in ♂♂) widening towards the tip, with a visible angle on the inner margin, tip curved backwards [Papua New Guinea: Morobe Province: Anggaie] ..... *O. stallei* sp. nov.
– Neck elongated (head index 1.5–1.92 in ♂♂, 1.4–1.88 in ♀♀) (e.g. plate 117 figs 13, 14, plate 118 figs 1-6). Fastigium not projected before the eyes. Antennae in ♂♂ long – longer than 7.5 mm in all species following this statement, except for *O. quateorum* where some ♂ specimens have antennae 5.85 mm long 30
30 Vertex flat. Two apical antennal segments (segments 14+15 in ♀♀, 13+14 in ♂♂) without silver bristles, those two segments together as long as third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂) Colouration of frontal region above clypeal triangle simple (one long pale marking running from medial ocellus to the clypeal triangle – i.e. moustache like patch is fused with pale marking above it, or simple narrow W – shaped line) 31
Vertex deep. Two apical antennal segments (segments 14+15 in ♀♀, 13+14 in ♂♂) with silver bristles, those two segments together shorter than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Colouration of frontal region above clypeal triangle rich (one W shape, moustache like or bow tie shaped pale patch and above it one long pale stripe, tear-shaped) 32
31 Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) with spine-like protruding tip. Lateral carinae of the vertex run somewhat convergent towards the tip. Larger species than the one compared, pronotum length 7.80 mm in ♂♂, 8.71 mm in ♀♀; antennae length 7.80 mm in ♂♂, 8.6 mm in ♀♀ [Papua New Guinea: Chimbu Province: environment of Karimu] .... *O. karimuiensis* sp. nov.
– Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) with angular (somewhat acute, almost right angle) tip. Lateral carinae of the vertex parallel. Smaller species, pronotum length 6–6.1 mm in ♂♂, 7.15–7.55 mm in ♀♀; antennae length 5.85–6. 89 mm in ♂♂, 6.61–7.15 mm in ♀♀ [Indonesian New Guinea: Star Mountains] ..... *O. quateorum* sp. nov.
32 Three apical antennal segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together as long as fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Outer margin of the fourth antennal segment distinctly lamellate, distal fourth of the segment with parallel or convergent edges. Neck long, head index 1.92 in ♂♂, 1.88 in ♀♀. Additional helpful character: fifth antennal segment from the tip, segment 11 in ♀♀, 10 in ♂♂ respectively, with a straight or backwards curved dorsal margin [Papua New Guinea: region of Fly river] ..... *O. flyriveriensis* sp. nov.
– Three apical antennal segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together visibly longer than the fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Outer margin of the fourth antennal segment not distinctly lamellate, distal fourth of the segment with parallel edges. Neck shorter, head index 1.55–1.74 in ♂♂, 1.65–1.83 in ♂♂ 33
33 Neck longer - head index 1.74 in ♂♂, 1.83 in ♀♀. Third to sixth antennal segments from the tip (segments 10+11+12+13 in ♀♀, 9+10+11+12 in ♂♂) narrow and elongated; sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) <0.18 mm long. Fourth antennal segment from the tip with short tip. Sixth antennal segment from the tip as wide as third. Tip of the fastigium dark [Papua New Guinea: Lakekamu River basin, Morobe / Gulf provinces] ... *O. katharinae* sp. nov.
– Neck shorter - head index 1.55 in ♂♂, 1.65 in ♀♀. Third to sixth antennal segments from the tip (segments 10+11+12+13 in ♀♀, 9+10+11+12 in ♂♂) broad and shorter; sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) >0.19 mm (mostly >0.2 mm). Fourth antennal segment from the tip with long tip. Sixth antennal segment from the tip wider than third. Tip of the fastigium brightened [Papua New Guinea: Morobe Province: environment of Lae] ..... *O. kaitani* sp. nov.
34 Fastigium slightly produced in front of the compound






eye forming minute horn. Subapical antennal segments slender in appearance (if other characters differ, compare to *O. tenuis*), fourth and fifth antennal segments from the tip (segments 11+12 in ♀♀, 10+11 in ♂♂) with weakly elevated inner margins, ending in angular protrusion, fourth segment 3x as long as wide, fifth 4x as long as wide. Additional helpful characters: head index 1.57 in ♂♂, 1.69–1.76 in ♀♀, vertex flat, fourth antennal segment widening towards the tip [Papua New Guinea: Western Highlands Province: Baiyer River basin and Upper Jimi River] ..... *O. rohwedderi* sp. nov.
– Fastigium not produced before the eyes. Subapical antennal segments (segments 11+12 in ♀♀, 10+11 in ♂♂) robust in appearance (except in *O. tenuis* in which segments are more robust than in *O. rohwedderi*, but less than in other species to which this statement leads), strongly widened, fourth and fifth antennal segments from the tip with strongly elevated and compressed inner margins, fourth usually ending in sharp tooth or spine, while fifth ending in angular protrusion or elongates spine-like tip, as well 35
35 Two apical antennal segments (segments 14+15 in ♀♀, 13+14 in ♂♂) with silver bristles. Inner (high) and outer (lower) margins of the fourth and fifth antennal segments from the tip (segments 11+12 in ♀♀, 10+11 in ♂♂) lamellate. Additional helpful characters: head index 1.55 in ♂♂, 1.44–1.68 in ♀♀, tip of the fastigium partly brightened, vertex flat, sixth antennal segment from the tip, segment 10 in ♀♀, 9 in ♂♂, without recognizable edges [Indonesian New Guinea: South Geelvink Bay] .... *O. schapinae* sp. nov.
– Two apical antennal segments (segments 14+15 in ♀♀, 13+14 in ♂♂) without silver bristles. Only inner margins of fourth and fifth antennal segments from the tip (segments 11+12 in ♀♀, 10+11 in ♂♂) lamellate, outer margins without high edges 36
36 Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) without recognizable edge. Head long, head index 1.9–2.2 37
– Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) with recognizable inner edge. Head shorter, head index 1.4–1.7 38
37 Hind femur slender (length/width ratio 6.2 in ♀♀, 6.5–6.7 in ♂♂) (Plate 120 figs 1, 2). Vertex flat. Medial carina of the vertex as high as the lateral carinae of the vertex or higher. Tip of the fastigium dark (Plate 112 figs 1, 2). Antennal segments more elongated resulting in longer antennae (10.1–10.3 mm in ♂♂, 10.92 mm in ♀♀) (Plate 108 figs 1, 2) [Indonesian New Guinea: upper Mamberamo river] ..... *O. tenuis* sp. nov.
– Hind femur stouter (length/width ratio 4.95–5.1 in ♀♀, 4.85–5 in ♂♂) (Plate 120 figs 12, 13). Vertex deep. Tip of the fastigium brightened. Medial carina of the vertex slightly elevated, not reaching height of the lateral carinae of the vertex (Plate 112 figs 13-15). Antennal segments more compressed resulting in shorter antennae (9.5 mm in ♂♂, 8.71–8.91 mm in ♀♀) (Plate 108 figs 11, 12) [Papua New Guinea: East Sepik and Madang provinces: middle of Sepik River to the Adelbert Mountains] ..... *O. modesta* Bolívar, 1929 stat. nov.
38 Three apical antennal segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together as long as fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Distal part of the fourth antennal segment from the tip with long tip (Plate 108 fig. 5). Tip of the fastigium dark or weakly brightened in the very apex (Plate 116 figs 5, 6). Hind femora without pale coloured markings (Plate 120 figs 5, 6). Additional helpful characters: two apical antennal segments together shorter than third segment from the tip; fourth and fifth antennal segments from the tip less than 2x wider than second segment from the tip [Papua New Guinea: East Sepik Province: Sepik River, Lordberg] .... *O. buergersi* Bolívar, 1929
– Three apical antennal segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Tip of the fourth antennal segment shorter (Plate 105 fig. 17, plate 107 fig. 10). Tip of the fastigium visibly brightened (Plate 113 fig. 19, plate 115 figs 10, 11). Hind femora with pale markings (Plate 117 fig. 19, plate 119 figs 10, 11) 39
39 Two apical antennal segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together shorter than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Fourth and fifth antennal segments from the tip (segments 11+12 in ♀♀, 10+11 in ♂♂) more than 3x wider than second segment from the tip. Distal part of the fourth antennal segment from the tip with convergent margins. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) almost equally wide as third segment from the tip (Plate 107 fig. 10) [Indonesian New Guinea: Waris, south of Jayapura] ..... *O. sanguinea* sp. nov.
– Two apical antennal segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together as long as third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Fourth and fifth antennal segments from the tip (segments 11+12 in ♀♀, 10+11 in ♂♂) less than 2x wider than second segment from the tip. Distal part of the fourth antennal segment from the tip with parallel margins. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) almost equally wide as third segment from the tip (Plate 105 fig. 17) [Papua New Guinea: East Sepik Province: Imbia near Maprik] .. *O. imbiana* sp. nov.

Catalogue of the known species (in chronological order)

***Ophiotettix limosina* (Snellen van Vollenhoven, 1865)** (Plate 108 figs 8-9, plate 112 figs 9-11, plate 116 figs 9-10, plate 120 figs 9-10, plate 122 fig. 15, plate 124 fig. 3)

Tettix limosinus Snellen Van Vollenhoven 1865: 65, pl. 1, fig. 6-8;
Tetricodina limosina Westwood 1874: 175, pl. 32, fig. 6b;






S[partolus] limosinus Bolívar 1887: 233-234;
Tettigodina limosina Bolívar 1898: 81;
T[ettigodina] limosina Hancock 1907: 8;
T[etricodina] limosina Kirby 1910: 3;
Ophiotettix limosina Bolívar 1929: 879-880, 883, 889-891;
Ophiotettix limosina Günther 1936: 344;
Ophiotettix limosina Günther 1938b: 3;
Ophiotettix limosina Günther 1939: 34;
Ophiotettix limosinus Steinmann 1970b: 159;
Ophiotettix limosinus Blackith 1992: 128;
Tetricodina limosina Yin et al. 1996: 914;
Ophiotettix limosina Otte 1997: 54.

Lectotype: ♀ NCB-RMNH: INDONESIAN NEW GUINEA, Gebeh [Gebe Island, 0°5'S 129°27'E], leg. Bernstein [antennae lost].
Paralectotypes: 1♀ NCB-RMNH: INDONESIAN NEW GUINEA, Gebeh [Gebe Island, 0°5'S 129°27'E], leg. Bernstein [antennae lost]; 1♀ NCB-RMNH, INDONESIAN NEW GUINEA, N[ew]. G[uinea], Gemica, leg. Bernstein. 1♀ NCB-RMNH: INDONESIAN NEW GUINEA, Waigeo, leg. Bernstein (antennae demolished); 1♀ OUMNH: INDONESIAN NEW GUINEA, Waigeo, ex. Mus. Leyden 1869.
Additional material: 1♀ NCB-RMNH: INDONESIAN NEW GUINEA, Waigeo, leg. Bernstein. 1♂ NCB-RMNH: INDONESIAN NEW GUINEA, Klamono Oilfields [1°10'S 131°30'E], 18.VIII.1948, leg. M. A. Lieftinck; 2♀ NCB-RMNH: INDONESIAN NEW GUINEA, Klamono Oilfields [1°10'S 131°30'E], 19.VIII.1948 [1♀ antennae lost], leg. M. A. Lieftinck [antennae lost]; 2♀, 1♂, 1♂ nymph NCB-RMNH: INDONESIAN NEW GUINEA, Klamono Oilfields [1°10'S 131°30'E], 20.VIII.1948, leg. M. A. Lieftinck [1♂ & 1♂ nymphs antennae lost]; 1♀ NCB-RMNH: INDONESIAN NEW GUINEA, Sorong, Malano [Malanu, 0°51'S 131°19'E], 27.VIII.1948, leg. M. A. Lieftinck. 1♀ TELNOV: INDONESIA E, W New Guinea, Doberai Peninsula, Ayamaru vill., ~15,5-14 km N, 1°08'04''S 132°10'59''E to 1°09'29''S 132°11'30''E, ~275-250 m, primary lowland rainforest on limestone, 2.IX.2015, leg. D. Telnov [antennae lost].

Notes: Snellen van Vollenhoven (1865) writes about one male and females from "Gebeh" (leg. Bernstein) and gives description and two drawings of the species. No authors designated types (valid lectotype), but a female had a "Type" label which may originate from C. Willemse while three other specimens have a "Cotype" label. Here we designate the female with the "Type" label for the lectotype and other specimens including a specimen from OUMNH paralectotypes. The aforementioned male has not been traced yet. Photo of a male specimen (Plate 124 fig. 3) and a nymph taken by Marek Stefunko (2011) from Arfak Mountains fits description of this. No other *Ophiotettix* records are known from Arfak Mountains. Other records of *Ophiotettix limosina* in literature are wrongly identified specimens (including those published by Bolívar (1898, 1929) and Günther (1936)).
Description: All antennal segments rounded, dark and very long (>10 mm). Lateral carinae of the vertex convergent. Tip of the fastigium brightened. Vertex, in frontal view, flattened. Pronotum with yellow stripes. Body dark with yellowish pronotal carinae and characteristic pale clypeal marking. Measurements lectotype ♀: pronotum length 10.53 mm, pronotum lobe width 4.16 mm, pronotum height 2.04 mm, hind femur length 10.40 mm, hind femur width 1.85 mm, vertex width 0.43 mm, eye width 0.68 mm, antenna length 11.05 mm, head length 5.50 mm, head index 1.41. Measurements 1♂ (Klamono Oilfields), pronotum length 9.75 mm, pronotum lobe width 4.03 mm, pronotum height 2.10 mm, hind femur length 9.88 mm, hind femur width 1.65 mm, vertex width 0.53 mm, eye width 0.62 mm, antenna length 10.66 mm, head length 4.60 mm, head index 1.33.
Differential diagnosis: *O. limosina* is the only species with all antennal segments totally rounded and no edges visible. The species is on the first sight similar to other species of the Limosina species group, but is easily separated from all of them by presented character.
Distribution: *O. limosina* is found on Gebe Island west of Waigeo. Gebe belongs administratively to North Moluccas but it is on the half way between Waigeo and Halmahera and was probably connected with Waigeo and New Guinea in the Ice Age. Other specimens are recorded from Waigeo and in the western part of Doberai Peninsula. Probably this species is distributed from the west of Doberai Peninsula to the Arfak Mountains in the northeastern part.

***Ophiotettix cygnicollis* Walker, 1871** (Plate 108 fig. 8, plate 112 figs 7-8, plate 116 figs 7-8, plate 120 figs 7-8, plate 122 fig. 14)
Ophiotettix cygnicollis Walker 1871: 847;
O[phiotettix] Cygnicollis Kirby 1910: 3;
Ophiotettix cygnicollis Bolívar 1929: 879-880, 883-885, figs 3, 8;
Ophiotettix cygnicollis Willemse 1931: 195;
Ophiotettix cygnicollis Günther 1937: 176;
Ophiotettix cygnicollis Günther 1938b: 2-3;
Ophiotettix cygnicollis Günther 1939: 33-35 ;
Ophiotettix cygnicollis Steinmann 1970a: 226;
Ophiotettix cygnicollis Steinmann 1970b: 159;
Ophiotettix cygnicollis Blackith 1992: 128;
Ophiotettix cygnicollis Yin et al. 1996: 891;
Ophiotettix cygnicollis Otte: 54;
= *Tetricodina luteo-marginata* Westwood, 1874: 176, pl.






32, fig. 6-6a;
Tettigodina luteo-marginata Bolívar 1887: 305, fig. 30, 30a;
Tettigodina luteomarginata Bolívar 1898: 80-81;
T[ettigodina] luteomarginata Hancock 1907: 8, fig. 3;
O[phiotettix] Cygnicollis Kirby 1910: 3 (synonymy with *T. luteomarginata*).

We follow synonymy proposed by Kirby (1910).

Holotype: ♀ BMNH: INDONESIAN NEW GUINEA, Dorei, leg. Wallace.
Syntypes *Tetricodina luteomarginata* Westwood, 1874: 1♂ OUMNH: INDONESIAN NEW GUINEA, Newguinea, Dorei, 1859, leg. Wallace; 1♀ [not found in OUMNH]: INDONESIAN NEW GUINEA, Newguinea, Menado, leg. Wallace (after Westwood).
Additional material: 1♂ MNCN: INDONESIAN NEW GUINEA, Ramoi [1°7'S 131°15'E], VII.1872, leg. L. M. d'Albertis [antennae lost]; 1♀ MNCN: INDONESIAN NEW GUINEA, Ramoi [1°7'S 131°15'E], II.1875, leg. Beccari; 2♀ MSNG: INDONESIAN NEW GUINEA, Ramoi [1°7'S 131°15'E], II.1875, leg. Beccari [1♀ antennae lost]; 1♀ MSNG: INDONESIAN NEW GUINEA, Andai [0°55'S 134°01'E], XII.1875, leg. Beccari; 1♂ MSNG: INDONESIAN NEW GUINEA, Dorei Hum. [Dore Hum Bay, E of Sorong; 0°46'S 131°31'E], II.1875, leg. Beccari; 1♀ OUMNH: NEW GUINEA: leg. Wallace [under *Ophiotettix cygnicollis*, antennae lost]; 1♀ OUMNH: INDONESIAN NEW GUINEA, Dor.[ei], leg. Wallace [under *Ophiotettix cygnicollis*, antennae lost]; 1♀ OUMNH: "Wag." [= Waigeo?], leg. Wallace; 1♀ NCB-RMNH: INDONESIAN NEW GUINEA, Klamono Oilfields [1°10'S 131°30'E], VIII.1948, leg. M. A. Lieftinck; 3♀, 2♂ ZSM: INDONESIAN NEW GUINEA, Manokwari Prov., Ransiki, Mayuby-Benyas [1°31'S 134°10'E], 300-400 m, 27.-28.IX.1990, leg. A. Riedel; 1♂ ZSM: INDONESIAN NEW GUINEA, Manokwari Prov., Kosmena, Anggi, Tetaho-area [1°20'S 133°55'E], 1400-1750 m, 26.-27.III.1993, leg. A. Riedel; 1♀ NCB-RMNH: INDONESIAN NEW GUINEA, Manokwari, Nieuw Guinea-Expeditie 1903, 9.V.1903, leg. E. Morales; 1♀ NCB-RMNH: INDONESIAN NEW GUINEA, Manokwari, Nieuw-Guinea-Expeditie 1903, 23.V.1903, leg. E. Morales. 1♀ ANSP: INDONESIAN NEW GUINEA, Manokwari, leg. T. Barbour [antennae lost]. 1♀ TELNOV: Doberai Peninsula, Ayamaru vill., ~15,5-14 km N, 1°08'04''S 132°10'59''E to 1°09'29''S 132°11'30''E, ~275-250 m, primary lowland rainforest on limestone, 2.IX.2015, leg. D. Telnov [antennae lost].
Doubtful material: 1♂ nymph OUMNH: INDONESIAN NEW GUINEA, Gebeh, 1♂ nymph, INDONESIAN NEW GUINEA, Gebeh, leg. Wallace [under *Ophiotettix cygnicollis*, antennae lost].

Note: On the island of Gebe *O. limosina* is hitherto the only reported species. Very doubtful record because it is not possible to identify these nymphs, especially without antennae. With antennae it is possible to differ nymphs from *O. cygnicollis* from species with rounded antennae like *O. limosina*. Hence we place this young specimen as *Ophiotettix* sp.
Description: Apical and subapical segments of the antennae black, other segments more brownish. Third to fifth antennal segments from the tip (segment 11+12+13 in ♀♀, 10+11+12 in ♂♂) like a "cup" with a long tip at the inner margin. Apical segments with narrow whitish bristles. Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together as long as third segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together shorter than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Outer margin of the fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) lamellate and curved. Lateral carinae convergent. Tip of the fastigium dark. Vertex, in frontal view flat, median carina higher than lateral carinae of the vertex. Pronotum with yellow stripes. Visible part of the abdomen yellow. Measurements syntype ♂ (*Tetricodina luteomarginata*): pronotum length 9.36 mm, pronotum lobe width 3.25 mm, pronotum height 1.96 mm, hind femur length 7.68 mm, hind femur width 1.50 mm, vertex width 0.41 mm, eye width 0.68 mm, antenna length 8.45 mm, head length 4.50 mm, head index 1.36. Measurements 2♂ (Ransiki): pronotum length 8.32-8.58 mm, pronotum lobe width 3.5-3.50 mm, pronotum height 1.95-2.0 mm, hind femur length 7.04-7:67 mm, hind femur width 1.50 mm, vertex width 0.39-0.43 mm, eye width 0.59-0.60 mm, antenna length 7.2-7.52 mm, head length 4.40 mm, head index 1.18-1.36. Measurements 2♀ (Ransiki): pronotum length 10.14-10.27 mm, pronotum lobe width 3.9-4.0 mm, pronotum height 2.4-2.50 mm, hind femur length 7.6-8.58 mm, hind femur width 1.65-1.75 mm, vertex width 0.41-0.43 mm, eye width 0.64-0.68 mm, antenna length 6.88-8.25 mm, head length 4.55-4.95 mm, head index 1.22-1.23.
Differential diagnosis: *O. cygnicollis* is one of the species without pale coloured apical antennal segments, characteristic in subapical antennal segments with lamellate inner margins and the third antennal segment from the tip with a distinct protruding long tip at the inner margin. *O. cygnicollis* is in morphology close to *O. amberiana* sp. nov., *O. pushkari* sp. nov., *O. storozhenkoi* sp. nov. (Cygnicollis species group) and *O. toxopei* sp. nov. (Toxopei species group). *O. toxopei* sp. nov. is unique in having widened third antennal segment from the tip. The neck of *O. cygnicollis* is significantly shorter than in aforementioned species (head






index in males <1.4, head index in females <1.3, respectively). The species with similar short neck is *O. pushkari* sp. nov. Those species can be separated by the fourth and fifth antennal segments from the tip morphology.

Distribution: Only found in the western part of New Guinea from Nabire over Doberai Peninsula to Salawati. Sulawesi (Günther 1938a; Steinmann 1970b) is a doubtful record and refers to the syntype of *Tetricodina luteomarginata* from Menado (leg. Wallace). The specimen is lost and up to now no *Ophiotettix* has been found on Sulawesi.

***Ophiotettix buergersi* Bolívar, 1929** (Plate 108 fig. 5, plate 112 figs 5-6, plate 116 figs 5-6, plate 120 figs 5-6, plate 122 fig. 13)

Ophiotettix bürgersi Bolívar 1929: 883, 885-887, fig. 7;
Ophiotettix bürgersi bürgersi Bolívar 1929: 883;
Ophiotettix bürgersi bürgersi Günther 1934: 333;
Ophiotettix bürgersi bürgersi Günther 1939: 34;
Ophiotettix bürgersi Steinmann 1970b: 159;
Ophiotettix buergersi, Blackith 1992: 127;
Ophiotettix burgersi Yin et al. 1996: 890;
Ophiotettix burgersi burgersi Otte 1997: 53.

Holotype 1♂ MFN: PAPUA NEW GUINEA, Lordberg [4°50'S 142°29'E], 10.XII.1912, leg. S. G. Bürgers.
Paratypes: 1♀ MFN (Allotype): PAPUA NEW GUINEA, Lordberg [4°50'S 142°29'E], 10.XII.1912, leg. S. G. Bürgers; 2♀, 1♂ MFN: PAPUA NEW GUINEA, Lordberg [4°50'S 142°29'E], 29.XI.-30.XI.1912, leg. S. G. Bürgers; 1♀, 2♂ MFN: PAPUA NEW GUINEA, Lordberg [4°50'S 142°29'E], 29.XI.-2.XII.1912, leg. S. G. Bürgers; 1♀ MFN: PAPUA NEW GUINEA, Lordberg [4°50'S 142°29'E], 5.-6.XII.1912, leg. S. G. Bürgers; 1♂ MFN: PAPUA NEW GUINEA, Lordberg [4°50'S 142°29'E], 7.XII.1912, leg. S. G. Bürgers; 1♂ MNCN: PAPUA NEW GUINEA, Lordberg [4°50'S 142°29'E], 9.XII.1912, leg. S. G. Bürgers; 2♀, 2♂ MFN: PAPUA NEW GUINEA, Lordberg [4°50'S 142°29'E], 10.XII.1912, leg. S. G. Bürgers; 1♀ MFN: PAPUA NEW GUINEA, Lordberg [4°50'S 142°29'E], 12.XII.1912, leg. S. G. Bürgers; 1♀ MNCN: PAPUA NEW GUINEA, Lordberg [4°50'S 142°29'E], 12.XII.1912, leg. S. G. Bürgers.
Additional material: 1♂ SMTD: PAPUA NEW GUINEA, Lordberg [4°50'S 142°29'E], 12.XII.1912, leg. S. G. Bürgers.

Note: Bolívar named the species "*bürgersi*". The correct transliteration of German phonem "ü" in Latin zoological nomenclature is after the Code diphthong "ue". For *bürgersi* it is thus *buergersi,* not *burgersi*. We use the correct name *O. buergersi*.
Description: Antennal segments brownish to dark. Only the tip (segment 14+15 in ♀♀, 13+14 in ♂♂) somewhat lighter. Apical segments with narrow whitish bristles. Three apical segments (segment 13+14+15 in ♀♀, 12+13+14 in ♂♂) together as long as fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Fourth antennal segment from the tip with a long tip, fifth antennal segment from the tip with a protruding edge and sixth antennal segment from tip with a protruding edge, as well. Lateral carinae of the vertex in frontal view distinctly higher than the median carina of the vertex. Fastigium, in lateral view, a little protruding before the eyes. Pronotum with yellow stripes. Tip of the fastigium, most of the visible parts of the abdomen and hind femur dark. Measurements holotype ♂: pronotum length 8.32 mm, pronotum lobe width 3.52 mm, pronotum height 1.75 mm, hind femur length 7.84 mm, hind femur width 1.70 mm, vertex width 0.41 mm, eye width 0.64 mm, antenna length 8.84 mm, head length 4.75 mm, head index 1.44. Measurements paratype ♀ (allotype), pronotum length 9.10 mm, pronotum lobe width 3.60 mm, pronotum height 2.15 mm, hind femur length 8.08 mm, hind femur width 1.75 mm, vertex width 0.43 mm, eye width 0.70 mm, antenna length 8.32 mm, head length 4.88 mm, head index 1.48.
Differential diagnosis: Together with *O. sanguinea* sp. nov. this is the only species with dark apical antennal segments where the sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) is broadly lamellate and bears a protruding tip or edge at the inner margin. It differs from *O. sanguinea* sp. nov. by the protruding tip of the sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) and the dark postfemora. *O. sanguinea* sp. nov. has reddish hind femora.
Distribution: Only found in the type locality, the Lordberg in the Sepik River area.

***Ophiotettix lorentzi* Bolívar, 1929** (Plate 108 fig. 10, plate 112 fig. 12, plate 116 fig. 11, plate 120 fig. 11, plate 122 fig. 16)

Ophiotettix lorentzi Bolívar 1929: 883, 888-889, fig. 6;
Ophiotettix lorentzi Günther 1938b: 2;
Ophiotettix lorentzi Günther 1939: 34;
Ophiotettix lorentzi Steinmann 1970b: 159;
Ophiotettix lorentzi Blackith 1992: 129;
Ophiotettix lorentzi Yin et al. 1996: 891;
Ophiotettix lorentzi Otte 1997: 54.

Holotype ♀ NCB-RMNH: INDONESIAN NEW GUINEA, Alkmaar [4°40'S 138°43'E], XI.1909, leg. Lorentz.
Paratype: 1♀ MNCN: INDONESIAN NEW GUINEA, Bivak Eiland [5°01'S 138°39'E], II.1910, leg. Lorentz.

Description: Apical and subapical segments of the antennae dark. Two apical segments (segment






14+15 in ♀♀, 13+14 in ♂♂) together shorter than third apical segment (segment 13 in ♀♀, 12 in ♂♂), fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) with a protruding edge. Outer margin of the fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) lamellate. Inner edge on the dorsal margin of the fifth antennal segment from the tip (segment 11 in ♀♀, 10 in ♂♂) directed backwards. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) broader than the third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae parallel. Tip of the fastigium brightened. Measurements holotype ♀: pronotum length 10.79 mm, pronotum lobe width 4.20 mm, pronotum height 2.45 mm, hind femur length 10.79 mm, hind femur width 1.90 mm, vertex width 0.43 mm, eye width 0.78 mm, antenna length 9.75 mm, head length 6.15 mm, head index 1.96. Measurements paratype ♀: pronotum length 11.02 mm, pronotum lobe width 3.99 mm, pronotum height 2.06 mm, hind femur length 10.22 mm, hind femur width 1.90 mm, vertex width 0.45 mm, eye width 0.78 mm, antenna length no measurements, head length 5.85 mm, head index 2.29.

Differential diagnosis: *O. lorentzi* is one of the species without pale coloured apical antennal segments, subapical antennal segments with lamellate inner margins and a fifth antennal segment from the tip with straight dorsal margin or it is curved backwards. The dorsal 1/4 of the length of fourth antennal segment from the tip runs parallel or convergent towards the tip and the third antennal segment from tip has no long prodruding tip. *O. lorentzi* is near to *O. flyriveriensis* sp. nov., *O. kaitani* sp. nov., *O. katharinae* sp. nov., *O. karimuiensis* sp. nov. and *O. quateorum* sp. nov. (Katharinae species group) but differs from *O. flyriveriensis* sp. nov., *O. kaitani* sp. nov. and *O. karimuiensis* sp. nov. in morphology of the fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂), in which the dorsal margin is straight or with a blunt protruding edge (angle), and without more or less longer acute tip. It differs from the *O quateorum* sp. nov. and *O. katharinae* sp. nov. in morphology of the sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂), this segment broader than the third antennal segment from the tip (in listed species it is smaller).

Distribution: Upper basin of the Lorentz River.

***Ophiotettix modesta* Bolívar, 1929 stat. rev.**
(Plate 108 figs 11-12, plate 112 figs 13-15, plate 116 figs 12-14, plate 120 figs 12-13, plate 122 fig. 17)

Ophiotettix bürgersi modesta Bolívar 1929: 883, 888;
Ophiotettix bürgersi modesta Günther 1938b: 3;
Ophiotettix bürgersi modesta Günther 1939: 34;
Ophiotettix modestus Steinmann 1970b: 159;
Ophiotettix burgersi modesta Yin et al. 1996: 891;
Ophiotettix burgersi modesta Otte 1997: 53.

Holotype ♂ MFN: PAPUA NEW GUINEA, [East Sepik, Prov.], Quelllager [4°32'S 142°41'E], 13.-16.VIII.1913, leg. S. G. Bürgers.

Paratypes: 1♀ (Allotype) MFN: PAPUA NEW GUINEA, [East Sepik, Prov.], Quelllager [4°32'S 142°41'E], 13.-16.VIII.1913, leg. S. G. Bürgers; 1♀, 1♂ MFN: PAPUA NEW GUINEA, [East Sepik, Prov.], Quelllager [4°32'S 142°41'E], 13.-16.VIII.1913, leg. S. G. Bürgers [antennae lost]; 1♂ MNCN: PAPUA NEW GUINEA, [East Sepik, Prov.], Quelllager [4°32'S 142°41'E], 13.-16.VIII.1913, leg. S. G. Bürgers; 1♀ MFN: PAPUA NEW GUINEA, [East Sepik, Prov.], Hunsteinspitze [4°30'S 142°35'E], 1350 m, VIII.1912, leg. S. G. Bürgers; 2♀ MFN: PAPUA NEW GUINEA, [East Sepik, Prov.], Hunsteinspitze [4°30'S 142°35'E], 25.II.1913, leg. S. G. Bürgers [antennae lost]; 1♀ nymph MFN: PAPUA NEW GUINEA, [East Sepik, Prov.], Hunsteinspitze [4°30'S 142°35'E], 2.III.1913, leg. S. G. Bürgers [antennae lost]; 1♀ MFN: PAPUA NEW GUINEA, [East Sepik, Prov.], Leonh. Schultzefluss, Lager 1-4 [4°18'S 142°18'E], leg. S. G. Bürgers; 1♂ MFN: PAPUA NEW GUINEA, [East Sepik, Prov.], Hauptlager bei Malu [4°13'S 142°49'E], 1.-2.I.1913, leg. S. G. Bürgers; 1♂ MFN: PAPUA NEW GUINEA, [East Sepik, Prov.], Hauptlager bei Malu [4°13'S 142°49'E], 7.I.1913, leg. S. G. Bürgers; 1♀ MFN: PAPUA NEW GUINEA, [East Sepik, Prov.], Hauptlager bei Malu [4°13'S 142°49'E], 27.I.1913, leg. S. G. Bürgers [antennae lost]; 2♀ MFN: PAPUA NEW GUINEA, [East Sepik, Prov.], Lager am Rosensee [4°22'S 142°43'E], 10.II.1913, leg. S. G. Bürgers [antennae lost]; 1♀ MNCN: PAPUA NEW GUINEA, [East Sepik, Prov.], Lager am Rosensee [4°22'S 142°43'E], 11.II.1913, leg. S. G. Bürgers; 1♂ MFN: PAPUA NEW GUINEA, East Sepik Prov., Lager am Rosensee [4°22'S 142°43'E], 13.II.1913, leg. S. G. Bürgers [antennae lost]; 1♂ MFN: PAPUA NEW GUINEA, [East Sepik, Prov.], Lager am Rosensee [4°22'S 142°43'E], 16.II.1913, leg. S. G. Bürgers [antennae lost].

Paratypes after original publication which were not traced: 1♀, 2♂, PAPUA NEW GUINEA, [East Sepik, Prov.], Quelllager [4°32'S 142°41'E]; 1♀, Lager am Rosensee [4°22'S 142°43'E].

Additional material: 1♀ MFN: PAPUA NEW GUINEA, [East Sepik Prov.], Kais.-Augustafl. Expedition, leg. S. G. Bürgers; 2♀, 3♂ MFN: PAPUA NEW GUINEA, [East Sepik Prov.], Regenberg [4°52'S 144°07'E], 550 m, 8.-15.V.1913, leg. S. G. Bürgers (1♀, 1♂ former paratypes of *O. buergersi buergersi*); 1♀ SMTD: PAPUA NEW GUINEA, [East Sepik Prov.], Regenberg [4°52'S 144°07'E], 550 m, 8.-15.V.1913, leg. S. G. Bürgers; 2♀ BPBM: PAPUA NEW GUINEA, [Madang Prov.], Adelbert Mts., Wanuma






[4°54'S 145°19'E], 800-1000 m, 26.X.1958, leg. J. L. Gressitt [one antenna lost]; 1♀ BPBM: PAPUA NEW GUINEA, [Madang Prov.], Adelbert Mts., Wanuma [4°54'S 145°19'E], 800-1000 m, 27.X.1958, leg. J. L. Gressitt.

Description: Apical and subapical segments of the antennae black or brownish. Two apical segments (segment 14+15 in ♀♀, 13+14 in ♂♂) combined shorter than third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segment 13+14+15 in ♀♀, 12+13+14 in ♂♂) together as long as fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Fifth antennal segment from the tip (segment 11 in ♀♀, 10 in ♂♂) with a protruding edge at the inner dorsal margin. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) as broad as third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex run parallel. Tip of the fastigium brightened. Median carina a little bit deeper than the lateral carinae. Visible part of the abdomen base colour yellowish, with black patches. Individuals from Wanuma completely fit types' morphology, but have head index is a little shorter. Female form L. Schultzefluss is little bit larger than other specimens. Fourth and fifth antennal segment from the tip (segment 11+12 in ♀♀, 10+11 in ♂♂) are in this specimen broader than segments of the specimens from Quellager. Measurements holotype ♂: pronotum length 8.97 mm, pronotum lobe width 3.95 mm, pronotum height 1.90 mm, hind femur length 8.32 mm, hind femur width 1.70 mm, vertex width 0.41 mm, eye width 0.66 mm, antenna length 9.49 mm, head length 5.0 mm, head index 2.0. Measurements paratype ♀ (allotype), pronotum length 10.14 mm, pronotum lobe width 4.05 mm, pronotum height 2.40 mm, hind femur length 8.84 mm, hind femur width 1.70 mm, vertex width 0.37 mm, eye width no measurements, antenna length 8.71 mm, head length 5.36 mm, head index 1.88. Measurements paratypes 1♀ (Leonh. Schultzefluss, Lager 1-4), pronotum length 11.18 mm, pronotum lobe width 4.60 mm, pronotum height 2.55 mm, hind femur length 9.36 mm, hind femur width 1.95 mm, vertex width 0.43 mm, eye width 0.68 mm, antenna length 8.84 mm, head length 5.52 mm, head index 2.18. 1 ♀ (Hunsteinspitze), pronotum length 9.49 mm, pronotum lobe width 3.80 mm, pronotum height 2.20 mm, hind femur length 8.97 mm, hind femur width 1.65 mm, vertex width 0.39 mm, eye width 0.66 mm, antenna length 8.79 mm, head length 5.20 mm, head index 2.29. 1 ♂ (Hauptlager bei Malu, 7.I.1913), pronotum length 9.75 mm, pronotum lobe width 3.90 mm, pronotum height 1.85 mm, hind femur length 8.19 mm, hind femur width 1.70 mm, vertex width 0.45 mm, eye width 0.59 mm, antenna length 8.97 mm, head length 4.88 mm, head index 1.91. 1 ♂ (Hauptlager bei Malu, 1.-2.I.1913), pronotum length 9.36 mm, pronotum lobe width 3.85 mm, pronotum height 1.65 mm, hind femur length no measurement, hind femur width no measurement, vertex width 0.43 mm, eye width 0.57 mm, antenna length 8.45 mm, head length 4.72 mm, head index 2.1. ♂ (Regenberg), pronotum length 9.23 mm, pronotum lobe width 4.0 mm, pronotum height 2.15 mm, hind femur length 8.45 mm, hind femur width 1.70 mm, vertex width 0.43 mm, eye width 0.68 mm, antenna length 9.49 mm, head length 5.28 mm, head index 2.09. ♀ (Regenberg), pronotum length 10.92 mm, pronotum lobe width 4.30 mm, pronotum height 2.25 mm, hind femur length 8.84 mm, hind femur width 1.80 mm, vertex width 0.43 mm, eye width 0.64 mm, antenna length 8.91 mm, head length 5.60 mm, head index 2.0.

Differential diagnosis: Bolívar (1929) described *O. modesta* as a subspecies of *O. buergersi*. It is distinguishable from *O. buergersi* Bolívar, 1929 accurately by some characters: *O. buergersi* has shorter neck (head index <1.5, *O. modesta* >1.8). In *O. modesta* the sixth antennal segment from the tip (tip (segment 10 in ♀♀, 9 in ♂♂) is not widened as in *O. buergersi*. In *O. modesta* hind femora and the tip of the fastigium is coloured (brightened), while in *O. buergersi* it is dark. *O. modesta* has enough strong differences (if here assessed variability of *Ophiotettix* and difference between the species are taken into account) from *O. buergersi* and we regard it valid, separate species. *O. modesta* is near to *O. buergersi* and *O. sanguinea* sp. nov. (they all belong to Buergersi species group). In *O. sanguinea* sp. nov. the sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) is broader than the third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). In *O. modesta* it is as broad as the third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). *O. sanguinea* sp. nov. has a shorter neck (head index <1.8, while in *O. modesta* >1.8). *O. modesta* is one of the species without pale coloured apical antennal segments, subapical antennal segments with lamellate inner margins and fifth antennal segment from the tip with protruded lateral edge. It is protruded visibly into spine or acute angle. *O. modesta* is near to *O. imbiana* sp. nov., *O. rohwedderi* sp. nov., *O. schapinae* sp. nov. and *O. tenuis* sp. nov. (all






members of Buergersi species group. It differs from these species (except *O. imbiana* sp. nov. and *O. rohwedderi* sp. nov.) by flat vertex. From these species it differs by three apical segments together being as long as the fourth segment from the tip (not longer than).

Distribution: Northeast of New Guinea from the middle of Sepik River to the Adelbert Mountains in the east.

***Ophiotettix scolopax* Bolívar, 1929** (Plate 104 figs 1-4, plate 108 fig. 13, plate 112 figs 16-17, plate 116 figs 15-16, plate 120 figs 14-15, plate 122 fig. 18)

Ophiotettix scolopax Bolívar 1929: 883, 891-892, figs 1, 2, 4, 5;
Ophiotettix scolopax Günther 1938b: 3;
Ophiotettix scolopax Steinmann 1970b: 159;
Ophiotettix scolopax Blackith 1992: 129;
Ophiotettix scolopax Yin et al. 1996: 891;
Ophiotettix scolopax Otte 1997: 54.

Holotype ♀ NCB-RMNH: INDONESIAN NEW GUINEA, Bivak Eiland [5°01'S 138°39'E], IX.1909, leg. Lorentz.
Paratypes: 1♂ [1/19, allotype] MNCN: INDONESIAN NEW GUINEA, Bivak Eiland [5°01'S 138°39'E], II.1910, leg. Lorentz [not seen]; 1♀ [2/19] NCB-RMNH: INDONESIAN NEW GUINEA, Bivak Eiland [5°01'S 138°39'E], IX.1909, leg. Lorentz. 1♂ [3/19] NCB-RMNH: INDONESIAN NEW GUINEA, Noord Rivier [= Lorentz River; 5°18'S 138°14'E], IX.1909, leg. Lorentz; 7♀ [4/19, 10/19] NCB-RMNH: INDONESIAN NEW GUINEA, Bivak Eiland [5°01'S 138°39'E], I.1910, leg. Lorentz; 1♀ [11/19] NCB-RMNH: INDONESIAN NEW GUINEA, Bivak Eiland [5°01'S 138°39'E], II.1910, leg. Lorentz; 5♀ [12/19-16/19], MNCN: INDONESIAN NEW GUINEA, Bivak Eiland [5°01'S 138°39'E], I.1910, leg. Lorentz [not seen]; 3♀ [17/19-19/19], MNCN: INDONESIAN NEW GUINEA, Bivak Eiland [5°01'S 138°39'E], I.1910, leg. Lorentz [not examined].
Additional material: 1♀ BMNH: INDONESIAN NEW GUINEA, Mimika River [4°30'S 136°30'E], VIII.1910, leg. A. F. R. Wollaston.

Description: *O. scolopax* is one of the largest species and has the neck longer than any other species (head length >7 mm and head index >3). Measurements holotype ♀: pronotum length 11.05 mm, pronotum lobe width 4.42 mm, pronotum height 2.39 mm, hind femur length -- mm, hind femur width -- mm, vertex width 0.47 mm, eye width 0.65 mm, antenna length 11.96 mm, head length 7.47 mm, head index 3.22. Measurements: paratype ♂ (Noord River), pronotum length 9.23 mm, pronotum lobe width 3.77 mm, pronotum height 1.99 mm, hind femur length 10.53 mm, hind femur width 1.56 mm, vertex width 0.41 mm, eye width 0.64 mm, antenna length 11.96 mm, head length 7.19 mm, head index 3.35. Measurements paratype ♀ (6/19), pronotum length 11.18 mm, pronotum lobe width 4.68 mm, pronotum height 2.31 mm, hind femur length 11.18 mm, hind femur width 1.82 mm, vertex width 0.43 mm, eye width 0.72mm, antenna length 11.88 mm, head length 7.27 mm, head index 3.56.
Differential diagnosis: *O. scolopax* is similar to *O. limosina* (Snellen van Vollenhoven, 1865), *O. bomberaiensis* sp. nov., *O. depressa* sp. nov., *O. filiforma* sp. nov., *O. luce* sp. nov., *O. mountnokensis* sp. nov. and *O. projecta* sp. nov. (all members of Limosina species group, composed of species with slender antennae without white tips). The species is unique because of its very long neck.
Distribution: Region of Lorentz and Mimika Rivers in the south coast of Indonesian New Guinea (with *O. lorenzi* Bolívar, 1929 and *O. flyriveriensis* sp. nov. the only species distributed south of the Central Range).

***Ophiotettix westwoodi* Bolívar, 1929 stat. rev.** (Plate 108 fig. 14, plate 112 figs 18-19, plate 116 figs 17-18, plate 120 figs 16-17, plate 122 fig. 19)

Ophiotettix bürgersi westwoodi Bolívar 1929: 887;
Ophiotettix bürgersi westwoodi Günther 1939: 34;
Ophiotettix westwoodi Steinmann 1970b: 159;
Ophiotettix burgersi westwoodi Yin et al. 1996: 891;
Ophiotettix burgersi westwoodi Otte 1997: 53.

Holotype 1♂ MFN: PAPUA NEW GUINEA, [East Sepik, Prov.], Mäanderberg [4°07'S 141°40'E], 21.-30. VIII.1913, leg. Bürgers.
Paratypes: 1♀ [allotype] MFN PAPUA NEW GUINEA, [East Sepik, Prov.], Mäanderberg [4°07'S 141°40'E], 21.-30.VIII.1913, leg. Bürgers; 1♀ MFN: PAPUA NEW GUINEA, [East Sepik, Prov.], Mäanderberg [4°07'S 141°40'E], 21.-30.VIII.1913, leg. Bürgers; 1♀ MFN: PAPUA NEW GUINEA, [East Sepik, Prov.], Mäanderberg [4°07'S 141°40'E], 1.-10.VIII.1913, leg. Bürgers; 2♂ MFN: PAPUA NEW GUINEA, [East Sepik, Prov.], Mäanderberg [4°07'S 141°40'E], 670 m, 19.-31. VII.1913, leg. Bürgers [antennae lost]; 1♂ MNCN: PAPUA NEW GUINEA, [East Sepik, Prov.], Mäanderberg [4°07'S 141°40'E], 670 m, 19.-31.VII.1913, leg. Bürgers; 1♀ MNCN: PAPUA NEW GUINEA, [East Sepik, Prov.], Hauptlager bei Malu [4°13'S 142°49'E], 20.I.1913, leg. S. G. Bürgers.
Additional material: 2♀, 1♂ nymph BMNH: INDONESIAN NEW GUINEA, Cyclops Mts., 3400-4500 ft., III.1936, leg. L. E. Cheesman [1♀ antennae lost]; 9♀, 5♂, 2♂ nymphs BMNH: INDONESIAN NEW GUINEA, Cyclops Mts., 3500 ft., III.1936, leg. L. E. Cheesman [4♀, 4♂ antennae lost] (NHMUK 10924594-10924609);






3♀, 4♂, 1♀ nymph BMNH: INDONESIAN NEW GUINEA, Cyclops Mts., Mt. Lina, 3500-4500 ft., III.1936, leg. L. E. Cheesman [3♀, 2♂ antennae lost] (NHMUK 10924610-10924617); 2♀ BMNH: INDONESIAN NEW GUINEA, Mt. Nomo, S. of Mt. Bougainville, 700 ft., II.1936, leg. L. E. Cheesman [1♀ antennae lost] (NHMUK 10924618-10924619); 1♂ nymph BMNH: INDONESIAN NEW GUINEA, Njau-limon, 300 ft., II.1936, leg. L. E. Cheesman (NHMUK 10924620); 2♂, 2♀ nymphs, 2♂ nymphs BPBM: INDONESIAN NEW GUINEA, [Cyclops Mts.], Ifar [2°34'S 140°31'E], 300-600 m, 20.VI.1959, leg. T. C. Maa; 3♀, 1♂ BPBM: INDONESIAN NEW GUINEA, [Cyclops Mts.], Ifar [2°34'S 140°31'E], 400-550 m, 23.VI.1959, leg. T. C. Maa; 2♀ BPBM: INDONESIAN NEW GUINEA, [Cyclops Mts.], Hollandia, Kota Baru [2°31'S 140°41'E], 25.-28.VI.1962, leg. J. L. Gressitt & N. Wilson [1♀ antennae lost]; 1♀ BPBM: INDONESIAN NEW GUINEA, Cyclops Mts., Ifar [2°34'S 140°31'E], 300-500 m, 23.-25.VI.1962, leg. J. L. Gressitt; 1♀, 1♀ nymph BPBM: INDONESIAN NEW GUINEA, Cyclops Mts., Ifar [2°34'S 140°31'E], 300-500 m, 23.-25.VI.1962, leg. J. L. Gressitt & J. Sedlacek [1♀ antennae lost]; 6♀ BPBM: INDONESIAN NEW GUINEA, Cyclops Mts., Ifar [2°34'S 140°31'E], 300-500 m, 26.-28.VI.1962, leg. J. Sedlacek [4♀ antennae lost]; 1♂, 1♀ nymph BPBM: INDONESIAN NEW GUINEA, Cyclops Mts., Ifar [2°34'S 140°31'E], 300-500 m, 28.-30.VI.1962, leg. J. L. Gressitt; 2♀ BPBM: INDONESIAN NEW GUINEA, Cyclops Mts., Ifar [2°34'S 140°31'E], 400-800 m, 7.-9.IX.1962, leg. J. Sedlacek [antennae lost]. 1♀ NCB-RMNH: INDONESIAN NEW GUINEA, Boven Sermowai rivier [2°45'S 140°15'E], 400 m, 6.V.1911, leg. P. N. v. Kampen [antennae lost]. 1♀ BPBM: PAPUA NEW GUINEA, [East Sepik, Prov.], Wewak [3°35'S 143°37'E], 2-20 m, 13.X.1957, leg. J. L. Gressitt [antennae lost].

Description: Apical segments of the antennae pale (third segment from the tip only a little). No antennal segment with clear tip at the inner margin. Three apical segments (segment 13+14+15 in ♀♀, 12+13+14 in ♂♂) together as long as or longer than the fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Outer margin of the fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) lamellate and curved. Apical segments with narrow whitish bristles. Lateral carinae of the vertex parallel. Median carina of the vertex lower than the lateral carinae. Lateral carinae of the vertex brightened. Pronotum with yellow stripes. Most of the body coloured. Head, in frontal view, and ventral margin of the hind femora yellow. The brightness of the third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂) varies - from a little at the tip (female from Cyclops Mts.) to more than a half (specimen from Ifar). The specimens from Cyclops Mts. (Mt. Lina, Mt. Nomo, leg. L.E. Cheesman) differs in colouration of the second and third antennal segment from the tip (segment 13+14 in ♀♀, 12+13 in ♂♂): the third segment has no pale colouration and the second segment is not pale at all, but a little brownish to the third segment. We find no other differences between the types and the specimens from Cyclops Mts. Further studies are needed to answer how diverse are specimens of this species, and if there is whole species complex inside with endemic taxa (species or subspecies) in isolated mountains. Measurements holotype ♂: pronotum length 7.54 mm, pronotum lobe width 3.25 mm, pronotum height 2.0 mm, hind femur length 6.63 mm, hind femur width 1.45 mm, vertex width 0.39 mm, eye width 0.61 mm, antenna length 7.80 mm, head length 4.25 mm, head index 1.38. Measurements paratype ♀ (allotype), pronotum length 8.58 mm, pronotum lobe width 3.75 mm, pronotum height 2.40 mm, hind femur length 7.67 mm, hind femur width 1.70 mm, vertex width 0.39 mm, eye width 0.66 mm, antenna length 8.45 mm, head length 4.90 mm, head index 1.55. Two other ♀♀ paratypes have head length 4.70 mm and head index 1.71. 1♀ and 1♂ from Ifar have head length 4.7 (4.3) mm and head index 1.36 (1.48).

Differential diagnosis: Bolívar (1929) describes *O. westwoodi* as a subspecies of *O. buergersi* Bolívar, 1929. It differs a lot from *O. buergersi* by pale apical antennal segments and the fourth antennal segment from tip (segment 12 in ♀♀, 11 in ♂♂), which does not have distinctly long tip at the inner margin. *O. westwoodi* is regarded as a separate species from *O. buergersi*, not its subspecies, but a valid species. As a species with pale apical antennal segments and at least one antennal segment with a protruding tip at the inner margin at the fourth antennal segment from the tip *O. westwoodi* is close to *O. cheesmanae* sp. nov. and *O. meggy* sp. nov. (all members of Westwoodi species group, together with *O. fritzpahli* sp. nov.). In *O. cheesmanae* sp. nov., third antennal segment from the tip is brightened to the half (in *O. westwoodi* only at the tip). The fifth antennal segment from the tip in *O. meggy* sp. nov. has a protruding edge at the inner dorsal margin (in *O. westwoodi* not) and furthermore *O. meggy* sp. nov. has distinct silver bristles on the apical antennal segments (in *O. westwoodi* not).

Distribution: From the environment of Jayapura in Indonesian New Guinea west to the upper Sepik River and Wewak in Sandaun and East Sepik Province.

Catalogue of the new species

Species arranged alphabetically.

***Ophiotettix amberiana* sp. nov.** (Plate 105 fig. 1, plate 109 figs 1-2, plate 113 figs 1-2, plate 117 figs 1-2, plate 121 fig. 1)









Holotype ♂ BMNH: INDONESIAN NEW GUINEA, Waigeo, Mt. Nok, IV.1938, leg. L. E. Cheesman.
Paratypes: 3♀, 2♂ (1/7-5/7) BMNH: INDONESIAN NEW GUINEA, Waigeo, Mt. Nok, IV.1938, leg. L. E. Cheesman, deposited in ZFMK (4/7), [3♀, 2♂ antennae lost]; 1♀ (6/7) BMNH: INDONESIAN NEW GUINEA, Waigeo, Mt. Nok, Camp 2, IV.1938, leg. L. E. Cheesman, deposited in ZFMK [antennae lost]; 1♀ (7/7) BMNH: INDONESIAN NEW GUINEA, Waigeo, Camp Nok, 2500 ft., IV.1938, leg. L. E. Cheesman [antennae lost].

Derivatio nominis: Toponymic. The species is named after its type locality, Waigeo Island. The island is also known by the name Amberi, which we found more suitable for the stem of Latin adjective, from it consequently making feminine gender of *amberianus*, -a –um (first and second Latin declension adjective).
Description: Antennal segments black. Third to fifth antennal segments from the tip (segments 11+12+13 in ♀♀, 10+11+12 in ♂♂) like a "cup", with a long tip at the inner margin. Apical segments with some narrow whitish bristles. Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together shorter than apical third segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together shorter than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) as broad as third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Fourth and fifth antennal segments from the tip (segment 11+12 in ♀♀, 10+11 in ♂♂) more than 3x as wide as the second apical antennal segment from the tip (segment 14 in ♀♀, 13 in ♂♂). Lateral carinae of the vertex run parallel. Tip of the fastigium dark. Median carina of the vertex nearly as high as the lateral carinae. Pronotum with reddish stripes. Visible part of the abdomen black. Hind femora with a brightened strip at the dorsal margin. Measurements holotype ♂ (pronotum a little bit damaged): pronotum length 9.23 mm, pronotum lobe width 3.05 mm, pronotum height 1.75 mm, hind femur length 8.06 mm, hind femur width 1.75 mm, vertex width 0.49 mm, eye width 0.72 mm, antenna length 10.14 mm, head length 4.90 mm, head index 1.64. Measurements paratypes 5♀: pronotum length (5): 10.4 - 11.83 mm, average 11.26 mm; pronotum lobe width (5): 4.05 - 4.95 mm, average 4.46 mm; pronotum height (5): 2.25 - 2.90 mm, average 2.64 mm; hind femur length (5): 8.58 - 11.18 mm, average 9.85 mm; hind femur width (5): 1.65 - 2.05 mm, average 2.01 mm; vertex width (4): 0.47 - 0.55 mm, average 0.51 mm; eye width (4): 0.68 - 0.74 mm, average 0.72 mm; antenna length (0): -; head length (5): 5.28 - 5.76 mm, average 5.57 mm; head index (5): 1.57 - 1.96 mm, average 1.76 mm. Measurements paratypes 3♂ (including holotype): pronotum length (3): 9.23 - 9.75 mm, average 9.49 mm; pronotum lobe width (2, without holotype): 3.75 - 4.40 mm, average 3.88 mm; pronotum height (2, without holotype): 2.05 - 2.70 mm, average 2.38 mm; hind femur length (3): 8.06 - 8.58 mm, average 8.32 mm; hind femur width (3): 1.6 - 1.75 mm, average 1.67 mm; vertex width (3): 0.47 - 0.49 mm, average 0.48 mm; eye width (3): 0.68 - 0.72 mm, average 0.69 mm antenna length (2): 10.14 - 10.53 mm, average 4.86 mm; head length (3): 4.9 - 5.12 mm, average 5.02 mm; head index (3): 1.48 - 1.73 mm, average 1.62 mm.
Differential diagnosis: *O. amberiana* sp. nov. is one of the species without pale coloured apical antennal segments, subapical antennal segments with lamellate inner margins and the third antennal segment from the tip with a distinctly protruding long tip at the inner margin. *O. amberiana* sp. nov. is near to *O. cygnicollis* sp. nov., *O. pushkari* sp. nov., *O. storozhenkoi* sp. nov. (Cygnicollis species group) and *O. toxopei* sp. nov. (Toxopei species group). *O. toxopei* sp. nov. is unique in having widened third antennal segment from the tip. *O. amberiana* sp. nov. differs from other species of the Cygnicollis species group in morphology of the sixth antennal segment, which is as broad as the third antennal segment from the tip and not smaller (>0.18 mm).
Distribution: Only found on Mount Nok in the north of Waigeo Island.

***Ophiotettix bewana* sp. nov.** (Plate 105 fig. 2, plate 109 fig. 3, plate 113 fig. 3, plate 117 fig. 3, plate 121 fig. 2)

Holotype ♀ BMNH: PAPUA NEW GUINEA, Humboldt Bay Dist. [Sandaun Prov.], Bewani Mts. [3°10'S 141°15'E], IX.1937, leg. W. Stüber.

Derivatio nominis: The species is named after the region of the locus typicus. The specific epithet is a Latin adjective (first and second declension) in the feminine gender (bewanus, -a, -um).
Description: First apical antennal segment and the half of the second (segments 14+15 in ♀♀, 13+14 in ♂♂) lighter brownish. Other segments of the antennae dark brownish. Lamellate antennal segments lacking. Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together shorter than third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segments 13+14+15






in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) narrow, without protruding edge at the inner dorsal margin. Fifth antennal segment from the tip (segment 11 in ♀♀, 10 in ♂♂) with straight dorsal margin. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) narrower than the third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex convergent. Tip of the fastigium dark. Vertex, in frontal view, flat, median carina of the vertex as high as the lateral carinae. Pronotum with yellow lateral parts and infrascapular area. Visible part of the abdomen predominantly yellow. Hind femur partially yellow. Measurements holotype ♀: pronotum length 9.62 mm, pronotum lobe width 4.03 mm, pronotum height 2.50 mm, hind femur length 8.97 mm, hind femur width 1.60 mm, vertex width 0.49 mm, eye width 0.64 mm, antenna length 10.14 mm, head length 5.20 mm, head index 2.23.

Differential diagnosis: *O. bewana* sp. nov. is one of the species with very narrow margins of the antennal segments and no protruding tip at the inner margin (members of the Limosina species group). Together with *O. mountnokensis* sp. nov. and *O. scolopax* (also members of Limosina species group), they are the only species of this group (and of the genus) with convergent lateral carina. It is easily separated from *O. scolopax* by the shorter neck and from *O. mountnokensis* sp. nov. by the dark tip of the fastigium.

Distribution: Bewani Mountains.

***Ophiotettix bomberaiensis* sp. nov.** (Plate 104 figs 6-7, plate 105 figs 3-4, plate 109 figs 4-5, plate 113 figs 4-5, plate 117 figs 4-5, plate 121 fig. 3)

Holotype ♂ BPBM: INDONESIAN NEW GUINEA, Vogelkop, S. coast of Bomberai, Fak Fak [2°55'S 132°17'E], 100-700 m, 5.VI.1959, leg. T. C. Maa.

Paratypes: 1♀ (1/27) BPBM: INDONESIAN NEW GUINEA, Vogelkop, S. coast of Bomberai, Fak Fak [2°55'S 132°17'E], 100-700 m, 3.VI.1959, leg. J. L. Gressitt [antennae lost]; 5♂ (2/27-6/27) BPBM: INDONESIAN NEW GUINEA, Vogelkop, S. coast of Bomberai, Fak Fak [2°55'S 132°17'E], 100-700 m, 4.VI.1959, leg. T. C. Maa, deposited in ZFMK (2/27) and NCB-RMNH (3/27) [2♂ antennae lost]; 1♂ (7/27), INDONESIAN NEW GUINEA BPBM: Vogelkop, S. coast of Bomberai, Fak Fak [2°55'S 132°17'E], 100-700 m, 5.VI.1959, leg. T. C. Maa, [antennae lost]; 2♀, 2♂ (8/27-11/27) BPBM: INDONESIAN NEW GUINEA, Vogelkop, S. coast of Bomberai, Fak Fak [2°55'S 132°17'E], 100-700 m, 8.VI.1959, leg. T. C. Maa, deposited in BMNH (9/27) and ZFMK (11/27) [1♀ antennae lost]; 1♂ (12/27) BPBM: INDONESIAN NEW GUINEA, Vogelkop, S. coast of Bomberai, Fak Fak [2°55'S 132°17'E], 100-700 m, 9.VI.1959, leg. T. C. Maa; 1♀ (13/27) BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700-900 m, 3.VI.1959, leg. J. L. Gressitt; 1♀, 1♂ (14/27-15/27) BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700-900 m, 4.VI.1959, leg. J. L. Gressitt; 1♂ (16/27) BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700-900 m, 4.VI.1959, leg. T. C. Maa; 3♀, 2♂ (17/27-21/27) BPBM: INDONESIAN NEW GUINEA, Vogelkop, Bomberi (1x Alpinia, 1x Ginger, 1x Palm), 700-900 m, 5.VI.1959, leg. J. L. Gressitt, deposited in NCB-RMNH (17/27) and BMNH (18/27); 2♂ (22/27-23/27) BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700-900 m, 7.VI.1959, leg. J. L. Gressitt [1♂ antennae lost]; 1♀, 1♂ (24/27-25/27) BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700-900 m, 7.VI.1959, leg. T. C. Maa, deposited in ZFMK (25/27) [antennae lost]; 1♂ (26/27) BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700-900 m, 9.VI.1959, leg. T. C. Maa; 1♀ (27/27) BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700-900 m, 9.VI.1959, leg. J. L. Gressitt.

Additional material: 1♀ MSNG: INDONESIAN NEW GUINEA, Kapaor [2°53'S 132°16'E], IV.1873, leg. L. M. d'Albertis; 5♂ nymphs, 4♀ nymph BPBM: INDONESIAN NEW GUINEA, Vogelkop, S. coast of Bomberai, Fak Fak [2°55'S 132°17'E], 100-700 m, 4.VI.1959, leg. T. C. Maa; 1♀ nymph, 3♂ nymphs BPBM: INDONESIAN NEW GUINEA, Vogelkop, S. coast of Bomberai, Fak Fak [2°55'S 132°17'E], 100-700 m, 5.VI.1959, leg. T. C. Maa; 1♀ nymph, 1 ♂ [head lost], 2♂ nymphs BPBM: INDONESIAN NEW GUINEA, Vogelkop, S. coast of Bomberai, Fak Fak [2°55'S 132°17'E], 100-700 m, 8.VI.1959, leg. T. C. Maa; 1♂ nymph BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700-900 m, 4.VI.1959, leg. T. C. Maa; 2♀ nymphs BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700-900 m, 5.VI.1959, leg. J. L. Gressitt; 5♀ nymphs, 2♂ nymphs BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700-900 m, 6.VI.1959, leg. T. C. Maa; 3♀ nymphs BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700-900 m, 6.VI.1959, leg. J. L. Gressitt; 2♀ nymphs BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700-900 m, 7.VI.1959, leg. T. C. Maa; 2♂ nymphs BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700-900 m, 7.VI.1959, leg. J. L. Gressitt; 1♂ nymph BPBM: INDONESIAN NEW GUINEA, Vogelkop, Bomberi (Palm), 700-900 m, 9.VI.1959, leg. J. L. Gressitt.

Derivatio nominis: Toponymic. The species is named after the region of the locus typicus. It is a Latin adjective of the Third declension, in feminine









gender (bomberaiensis, -e).

Description: All antennal segments brownish. No antennal segment broadly lamellate. Third to fifth antennal segments from the tip (segments 11+12+13 in ♀♀, 10+11+12 in ♂♂) with low inner margins. Apical segments with narrow whitish bristles. Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together shorter than third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segment 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂), narrow and elongate, longer than fifth antennal segment from the tip (segment 11 in ♀♀, 10 in ♂♂). Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) broader than the third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex convergent. Tip of the fastigium brightened with one exception (paratype 25/27 has dark fastigium). Vertex, in frontal view, flat, median carina of the vertex as high as lateral carinae. Pronotum not with distinct yellow stripes, only with small lines. Visible part of the abdomen and lateral lobes yellow. 3♂ with a head index 1.30 to 1.32 (smaller than in other specimens) show no other differences and we regard them to fit variability of the species. Measurements holotype ♂: pronotum length 7.54 mm, pronotum lobe width 3.35 mm, pronotum height 1.85 mm, hind femur length 9.10 mm, hind femur width 1.40 mm, vertex width 0.35 mm, eye width 0.74 mm, antenna length 8.84 mm, head length 4.75 mm, head index 1.52. Measurements paratypes 10♀: pronotum length (10♀): 8.19 - 9.88 mm, average 8.63 mm; pronotum lobe width (10♀): 3.75 - 4.30 mm, average 3.86 mm; pronotum height (10♀): 1.75 - 2.25 mm, average 1.96 mm; hind femur length (6♀): 9.75 - 10.40 mm, average 9.99 mm; hind femur width (6♀): 1.45 - 1.55 mm, average 1.51 mm; vertex width (10♀): 0.37 - 0.49 mm, average 0.43 mm; eye width (10♀): 0.66 - 0.78 mm, average 0.70 mm; antenna length (7♀): 9.49 - 10.40 mm, average 9.92 mm; head length (10♀): 5.04 - 5.68 mm, average 5.26 mm; head index : 1.46 - 1.80 mm, average 1.61 mm. Measurements paratypes 18♂ (including holotype): pronotum length (18♂): 6.76 - 8.84 mm, average 7.42 mm; pronotum lobe width (18♂ within holotype): 3.15 - 3.18 mm, average 3.36 mm; pronotum height (18♂ within holotype): 1.3 - 1.90 mm, average 1.67 mm; hind femur length (17 ♂♂): 8.84 - 10.40 mm, average 9.25 mm; hind femur width (17♂): 1.3 - 1.65 mm, average 1.39 mm; vertex width (18♂): 0.35 - 0.49 mm, average 0.42 mm; eye width (18♂): 0.49 - 0.74 mm, average 0.66 mm; antenna length (12♂): 8.84 - 10.40 mm, average 9.75 mm; head length (18♂): 4.56 - 5.20 mm, average 4.86 mm; head index (18♂): 1.35 - 1.74 mm, average 1.54 mm

Differential diagnosis: *O. bomberaiensis* sp. nov. is one of the species with dark antennae and antennal segments with small margins but not lamellate or broadened. Other species of this group (Limosina species group) with similar antennae are: *O. scolopax* Bolívar, 1929, *O. bewana* sp. nov., *O. depressa* sp. nov., *O. filiforma* sp. nov., *O. luce* sp. nov., *O. mountnokensis* sp. nov. and *O. projecta* sp. nov. Only *O. limosina* (Snellen van Vollenhoven, 1865) in this group has completely rounded antennal segments. *O. bomberaiensis* sp. nov. differs from all other species by the fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) morphology. It is narrow and elongate, longer than fifth antennal segment from the tip (segment 11 in ♀♀, 10 in ♂♂).

Distribution: Fak Fak Mountains, Onin Peninsula in the west of Bomberai Peninsula.

***Ophiotettix brevicollis* sp. nov.** (Plate 105 figs 5-6, plate 109 figs 6-7, plate 113 figs 6-7, plate 117 figs 6-7, plate 121 fig. 4)

Holotype: ♂ BPBM: PAPUA NEW GUINEA, [Morobe Prov.], [Kuper Range], Wau, Mt. Missim [7°13'S 146°49'E], 1100 m, 17.I.1963, leg. H. W. Clissold.

Paratypes: 1♀, 1♂ (1/41, 2/41) BPBM: PAPUA NEW GUINEA, [Morobe Prov., Kuper Range, Wau], Mt. Missim [7°13'S 146°49'E], 1100 m, 22.II.1968, leg. P. Colman; 1♀, 1♂ (3/41-4/42) BPBM: PAPUA NEW GUINEA, Morobe Prov., [Kuper Range], Wau, Mt. Missim [7°13'S 146°49'E], 1100 m, 17.I.1963, leg. H. W. Clissold [both antennae lost]; 1♀ (5/41) BPBM: PAPUA NEW GUINEA, [Morobe Prov., Kuper Range, Wau], Mt. Missim, 7°13'S 146°98'E, 1500 m, leg. J. & M. Sedlacek; 1♀ (6/41) ANSP: PAPUA NEW GUINEA, [Morobe Prov., Kuper Range, Wau], Mt. Missim, [7°13'S 146°49'E], leg. Stevens; 1♀ (7/41) BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau, Nami Creek, 1700 m, 22.VIII.1963, leg. J. Sedlacek; 1♀ (8/41) BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau, Nami Creek, 1700 m, 17.V.1965, leg. J. Sedlacek; 2♀, 2♂ (9/41-12/41) BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau [7°20'S 146°43'E], 1200 m, 16.VI.1961, leg. J. Sedlacek, deposited in BMNH (9/41), [12/41 antennae lost]; 1♀ (13/41) BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau [7°20'S 146°43'E], 1200 m, 27.X.1961, leg. J. Sedlacek; 1♀ (14/41) BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau [7°20'S 146°43'E], 1200 m, 15.VIII.1961, leg. J. Sedlacek; 2♀ (15/41-16/41) BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau [7°20'S 146°43'E], 1200 m, 19.XI.1961, leg. J. H., J.





& M. Sedlacek, deposited in NCB-RMNH (16/41); 1♀ (17/41) BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau [7°20'S 146°43'E], 1270 m, 14.V.1962, leg. J. Sedlacek; 1♀ (18/41) BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau [7°20'S 146°43'E], 1200 m, 2.VI.1962, leg. J. Sedlacek; 1♂ (19/41) BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau [7°20'S 146°43'E], 1700 m, 7.II.1963, leg. J. Sedlacek, deposited in NCB-RMNH; 1♂ (20/41) BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau [7°20'S 146°43'E], 1250 m, 3.IV.1964, leg. J. Sedlacek; 1♀, 1♂ (21/41, 22/41) BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau [7°20'S 146°43'E], 1150-1600 m, 9.II.1968, leg. J. Sedlacek; 1♀ (23/41) BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau [7°20'S 146°43'E], 1700 m, 15.I.1969, leg. J. Sedlacek, deposited in ZFMK; 1♂ (24/41) BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau [7°20'S 146°43'E], 1700 m, 12.III.1969, leg. J. Sedlacek; 1♀ (25/41) BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau [7°20'S 146°43'E], 1750 m, 14.V.1969, leg. J. Sedlacek; 1♂ (26/41) BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau [7°20'S 146°43'E], 1700m, 21.VII.1969, leg. Y. Hirashima, deposited in ZFMK; 1♀ (27/41) BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau [7°20'S 146°43'E], 1100 - 1200 m, VII.1968, leg. N. L. H. Krauss; 1♀, 1♂ (28/41, 29/41), HNHM, New Guinea, NG.W C.17; 1♀ (30/41) MFN: PAPUA NEW GUINEA, Junzaing, I.1929, leg. E. Mayr; 1♀ (31/41) BPBM: PAPUA NEW GUINEA, Morobe Prov., Bulldog Road, S of Wau (collected on Evia spec.), 2700 - 2950 m, 1974, leg. J. L. Gressitt; 1♂ (32/41) BPBM: PAPUA NEW GUINEA, Morobe Prov., Kilolo Creek, 7 km W of Wau, 1070 m, 15.-25.VIII.1967, leg. Tawi, deposited in BMNH; 1♀ (33/41) BPBM: PAPUA NEW GUINEA, [Morobe Prov.], Garaina [7°53'S 147°08'E], 800 m, 16.I.1968, leg. J. & M. Sedlacek; 1♀ (34/41) BPBM: PAPUA NEW GUINEA, [Morobe Prov.], Garaina [7°53'S 147°08'E], 800 m, 29.XI.-17.XII.1969, leg. A. B. Mirza; 1♂ (35/41) BPBM: PAPUA NEW GUINEA, Kuper Range., 700 m, 24.I.1969, leg. J. Sedlacek; 2♂ (36/41-37/41) BMNH: PAPUA NEW GUINEA, Morobe Prov., Herzog Mts, Vagau [6°49'S 146°45'E], 4000 ft., 4.-17.I.1965, leg. M. E. Bacchus; 1♂ (38/41) BPBM: PAPUA NEW GUINEA, Morobe Prov., Aseki [7°21'S 146°12'E], 1100 m, 13.IV.1974, leg. J. L. Gressitt; 1♀ (39/41), BPBM; PAPUA NEW GUINEA, Morobe Prov., Aseki [7°21'S 146°12'E], 1100 m, 13.IV.1974, leg. R. Sakomdaru; 1♀, 1♂ (40/41-41/41) BPBM: PAPUA NEW GUINEA, Morobe Prov., Bulolo Gorge, ca. 800 m, 17.I.1962, leg. G. Monteith.

Additional material (all antennae lost or damaged or juvenile): 4♀, 1♀ nymph, 1♂ nymph BMNH: PAPUA NEW GUINEA, Mafulu, 4000 ft, I.1934, leg. L. E. Cheesman (NHMUK 010924382 - 010924387); 1♀ nymph BMNH: PAPUA NEW GUINEA, Kokoda [8°39'S 147°15'E], 1200 ft, VI.1933, leg. L.E. Cheesman (NHMUK 010924390); 1♂, 1♀ BMNH: PAPUA NEW GUINEA, Kokoda [8°39'S 147°15'E], 1200 ft, VIII.1933, leg. L.E. Cheesman (NHMUK 010924388 + 010924590389); 1♂, 3♀ nymphs BMNH: PAPUA NEW GUINEA, [Central Prov.], Mt. Tafa [8°38'S 147°11'E], 8500 ft, II.1934, leg. L. E: Cheesman; 1♀ BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau, 1200 m, 27.VI.1961, leg. J. H. Sedlacek; 1♂ nymph BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau [7°20'S 146°43'E], 1300 m, 26.-27.VII.1961, leg. J. Sedlacek; 1♀ BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau, 1200 m, 25.VIII.1961, leg. J. Sedlacek; 1♀ BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau, 1050 m, 30.IX.1961, leg. J. H., J. & M. Sedlacek; 1♂ BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau, 1050 m, 2.X.1961, leg. J. Sedlacek; 1♂ BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau, Edie Ck. (M.V. Light Trap) [7°20'S 146°43'E], 2000 m, 4.-10.X.1961, leg. J. & J. H.Sedlacek; 1♀, 1♂ BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau, 1200 m, 18.XII.1961, leg. L. W. Quate; 4♀ BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau, 1200 m, 22.XII.1961, leg. J. H. & J. Sedlacek; 1♂ BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau, 1200-1300 m, 4.II.1962, leg. G. Monteith; 1♀ BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau, 1200 m, 2.VI.1962, leg. J. Sedlacek; 1♀, 1♂ BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau, 1200 m, 15.-30.IX.1962, leg. J. Sedlacek; 1♀ BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau, 1700 m, 28.I.1963, leg. J. Sedlacek; 1♀ BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau Ck., 1500 m, 28.III.1963, leg. J. Sedlacek; 1♂ BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau, 1200 m, 5.V.1963, leg. J. Sedlacek; 1♀ BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau, 1300 m, 24.XI.1963, leg. J. L. Gressitt; 1♀, 1♂ BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau, 1250 m, 3.IV.1964, leg. J. Sedlacek; 1♀ BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau, Nami Ck., 1700 m, 22.V.1965, leg. J. Sedlacek; 1♀ BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau, 1200-1300 m, IX.1965, leg. J. Sedlacek; 1♀ nymph BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau, 1200 m, 14.III.1966, leg. J. L. Gressitt; 1♀ nymph BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau, Edie Ck., 1700 m, 2.IV.1966, leg. J. L. Gressitt; 1♀ nymph, 1♂ BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau, 1150-1600 m, 9.II.1968, leg. J. Sedlacek; 1♀ BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau, 1200-1500 m, VII.1968, leg. N. L. H. Krause; 1♀ BPBM: PAPUA NEW GUINEA, Morobe Prov., Wau, 18.VI., leg. J. & M. Sedlacek; 1♀ BPBM: PAPUA NEW GUINEA, Morobe Prov., [Kuper Range], Wau, Mt. Missim [7°13'S 146°49'E], 1650 m, 1.III.1963, leg. J. Sedlacek; 1♀ BPBM: PAPUA NEW GUINEA, [Morobe Prov., Kuper Range, Wau], Mt. Missim [7°13'S 146°49'E], 1100 m, 22.II.1968, leg. P. Colman; 1♀ BPBM: PAPUA NEW GUINEA, [Morobe Prov., Kupfer Range, Wau], Mt. Missim (Primary forest under story), [7°13'S 146°49'E], 1600 m, leg. Thane Pratt; 1♀ BPBM: PAPUA NEW GUINEA, Morobe Prov., Bulldog Road, 70 km S of Wau, 1100-1800 m, 22.-31.-V.1969, leg. J. Sedlacek; 1♂ BPBM: PAPUA NEW GUINEA, Morobe Prov., Bulldog Road, 60 km S of Wau, 2070 m, 22.-31.-V.1969, leg. J. Sedlacek; 1♂ BPBM: PAPUA NEW GUINEA, Morobe Prov., Bulolo, 1700 m, 26.XI.1969, leg. J. & M. Sedlacek; 1♀ BPBM: PAPUA NEW GUINEA, Morobe Prov., 20 km ESE Kaisenik (Longleef Pipturus) [7°28'S 146°56'E], 1500 m,






5.X.1974, leg. J. L. Gressitt; 1♀ BPBM: PAPUA NEW GUINEA, Morobe Prov., Aseki (on Sloania) [7°21'S 146°12'E], 1100 m, 13.IV.1974, leg. J. L. Gressitt; 1♀ BPBM: PAPUA NEW GUINEA, Morobe Prov., Mt. Shungol, Rari [6°52'S 146°43'E], 1250 m, 1.VI.1967, leg. J. L. Gressitt; 1♂ BPBM: PAPUA NEW GUINEA, Morobe Prov., Garaina [7°53'S 147°08'E], 830 m, 15.I.1968, leg. J. & M. Sedlacek; 1♀, 2♂ BPBM: PAPUA NEW GUINEA, Morobe Prov., Garaina [7°53'S 147°08'E], 800 m, 16.I.1968, leg. J. & M. Sedlacek; 1♀ BPBM: PAPUA NEW GUINEA, Morobe Prov., Garaina [7°53'S 147°08'E], 550-750 m, 16.I.1968, leg. J. & M. Sedlacek; 1♀ BPBM: PAPUA NEW GUINEA, Morobe Prov., Tapini [8°22'S 146°59'E], 1000-1100 m, 18.V.1961, leg. J. L. & M. Gressitt; 1♀ BMNH: PAPUA NEW GUINEA, Morobe Dist., Herzog Mts, Vagau Vagau [6°49'S 146°45'E], 4000 ft., 4.-17.I.1965, leg. M. E. Bacchus [antennae damaged]; 1♂ BPBM: PAPUA NEW GUINEA, Morobe Prov., Mt. Lawson, Camp 3 (on Trema orientalis) [7°44'S 146°37'E], 1400 m, 13.III.1974, leg. J. L. Gressitt; 1♂, 1♀ nymph BMNH: PAPUA NEW GUINEA, Morobe Prov., Mt. Missim, [7°13'S 146°49'E], 1900 m, 12.VII.1990, leg. G. W. Beccaloni (NHMUK 010924589 + 010924590).

Derivatio nominis: The specific epithet is a combination of two Latin words, one adjective and a noun - 'brevi-' being borrowed from Third declension adjective 'brevis, -e', meaning short, while 'collis' is ablative plural of the neuter gender second (-us) declension noun 'collum, -i, n.' meaning neck. Whole epithet thus means 'with short neck' and is plural noun in ablative. The species is named in such way because of the short head.

Description: Apical and subapical segments of the antennae black, other segments brownish. Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together longer than the third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Only fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) with a protruding tip at the inner dorsal margin. This segment is widened towards the tip. Inner edge of the dorsal margin of the fifth antennal segment from the tip (segment 11 in ♀♀, 10 in ♂♂) runs backwards. Lateral carinae of the vertex run parallel. Tip of the fastigium brightened. Median carina, in frontal view, deeper than the lateral carinae. Pronotum with yellow stripes. Visible part of the abdomen partially yellow. Measurements holotype ♂: pronotum length 6.64 mm, pronotum lobe width 3.0 mm, pronotum height 1.70 mm, hind femur length 6.40 mm, hind femur width 1.32 mm, vertex width 0.27 mm, eye width 0.59 mm, antenna length 6.15 mm, head length 3.90 mm, head index 1.19. Measurements paratypes 25♀: pronotum length (25♀): 7.41 - 9.10 mm, average 8.11 mm; pronotum lobe width (25♀): 3.4 - 3.75 mm, average 3.53 mm; pronotum height (24♀): 1.45 - 2.15 mm, average 1.59 mm; hind femur length (21♀): 6.63 - 8.19 mm, average 7.45 mm; hind femur width (21♀): 1.45 - 1.75 mm, average 1.61 mm; vertex width (25♀): 0.27 - 0.40 mm, average 0.35 mm; eye width (25♀): 0.55 - 0.64 mm, average 0.60 mm; antenna length (23♀): 5.85 - 7.15 mm, average 6.43 mm; head length (24♀): 3.0 - 4.65 mm, average 4.06 mm; head index (24♀): 1.1 - 1.45 mm, average 1.32 mm; Measurements, paratypes 16 ♂: pronotum length (16♂): 6.33-7.28 mm, average 6.79 mm; pronotum lobe width (16♂): 2.8-3.20 mm, average 3.02 mm; pronotum height (16♂): 1.25-1.75 mm, average 1.48 mm; hind femur length (10♂): 6.24-7.02 mm, average 6.54 mm; hind femur width (9♂): 1.32-1.50 mm, average 1.44 mm; vertex width (16♂): 0.27-0.37 mm, average 0.32 mm; eye width (16♂): 0.55-0.60 mm, average 0.58 mm; Antenna length (15♂): 5.59-7.15 mm, average 6.36 mm; head length (16♂): 3.6-4.10 mm, average 3.88 mm; head index (16♂): 1.05-1.50 mm, average 1.27 mm.

Differential diagnosis: *O. brevicollis* sp. nov. is one of the species without pale coloured apical antennal segments, subapical antennal segments with lamellate inner margins and the upper edge of the fifth antennal segment from the tip is straight or curved backwards. The fourth antennal segment from the tip is widened in its whole length towards the tip. There are three other species with similar characters: *O. roesleri* sp. nov. (Brevicollis species group), *O. stallei* sp. nov. (Stallei species groups) and *O. subbrevicollis* sp. nov. (Brevicollis species group). All the mentioned species are very small in body size. *O. brevicollis* sp. nov. differs from *O. stallei* sp. nov. and *O. subbrevicollis* sp. nov. by the sixth antennal segment from the tip which is not widened with a recognizable edge. From *O. roesleri* sp. nov. it differs by the brightened tip of the fastigium and even smaller size.

Distribution: Kuper Range and north of Owen Stanley Range south to Tapini.

***Ophiotettix cheesmanae* sp. nov.** (Plate 105 fig. 7, plate 109 fig. 8, plate 113 fig. 8, plate 117 fig. 8, plate 121 fig. 5)

Holotype: ♀ BMNH: INDONESIAN NEW GUINEA, Yapen, Central Range, Mt. Oud, Camp 3 [1°44'50''S 136°12'07''E], 3500 ft., XI.1938, leg. L. E. Cheesman.






Derivatio nominis: Patronymic. The species is named after Lucy Evelyn Cheesman (1882-1969). This lovely British entomologist, anthropologist, polyglot, adventurer and heroine spent 12 years (during the 1920s and 1930s) travelling alone (without European colleagues) and investigating nature in the New Guinean Region, meeting local tribes and learning local languages. She was known among local tribes as 'the Woman Who Walks' and our favourite - 'the Lady of the Mountains'. She collected between 1924 and 1952 in eight expeditions in the South Pacific over 70000 specimens. We are honoured to work on the material she collected during her peculiar expeditions, and happy to dedicate this species to her. The specific epithet represents the genitive case of the first declension (a- declension, de facto only for feminine gender nouns) Latinized form of Lucy's surname 'Cheesmana, ae, f.' We decided to name this species from the high, inaccessible mountains of Yapen island In her honour - let it be an adventure to find the Giraffehopper of Lucy Evelyn again.

Description: Apical segments of the antennae pale (third segment from the tip to the half of its length). Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together shorter than the third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segment 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than the fourth segment from the tip (segments 12 in ♀♀, 11 in ♂♂). Only fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) with a protruding tip at the inner dorsal margin. Outer margin of this antennal segment lamellate and curved. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) broader than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex run parallel. Tip of the fastigium dark. Median carina of the vertex, in frontal view, deeper than lateral carinae. Pronotum with brightened stripes. Visible part of the abdomen dark. Hind femur with one brightened patch at the dorsal margin close to the basis. Measurements holotype ♀: pronotum length 9.75 mm, pronotum lobe width 4.15 mm, pronotum height 2.20 mm, hind femur length 8.71 mm, hind femur width 1.75 mm, vertex width 0.43 mm, eye width 0.74 mm, antenna length 9.10 mm, head length 5.04 mm, head index 1.77.

Differential diagnosis: As a species with pale apical antennal segments and at least one antennal segment with a protruding tip at the inner margin at the fourth antennal segment from the tip *O. cheesmanae* sp. nov. is morphologically similar to *O. westwoodi* stat. rev. and *O. meggy* sp. nov. (together with this species belong to Westwoodi species group, including also *O. fritzpahli* sp. nov.). In *O. cheesmanae* sp. nov. the third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂m) is brightened to the half (in *O. westwoodi* stat. rev. only at the tip). The fifth antennal segment from the tip (segment 11 in ♀♀, 10 in ♂♂) in *O. meggy* bears a protruding edge at the inner dorsal margin (in *O. cheesmanae* sp. nov. not) and has distinct silver bristles on the apical antennal segments (*O. cheesmanae* sp. nov. does not have silver bristles).

Distribution: Only Mt. Oud on Yapen (or Japen, or Jobi) - collected during the hike to the highest point of Yapen island, in central parts of its mountains - at about 1100 m a.s.l.

***Ophiotettix depressa* sp. nov.** (Plate 105 figs 8-9, plate 109 figs 9-10, plate 113 figs 9-10, plate 117 figs 9-10, plate 121 fig. 6)

Holotype: ♂ MFN: PAPUA NEW GUINEA, [East Sepik Prov.], Lordberg [4°50'S 142°29'E], 2.-4.XII.1912, leg. S. G. Bürgers.

Paratypes: 1♀ (1/4) MFN: PAPUA NEW GUINEA, [East Sepik Prov.], Lordberg [4°50'S 142°29'E], 29.XI.-2.XII.1912, leg. S. G. Bürgers; 1♀ (2/4) MFN: PAPUA NEW GUINEA, [East Sepik Prov.], Lordberg [4°50'S 142°29'E], 7.XII.1912, leg. S. G. Bürgers; 1♀ (3/4) MFN: PAPUA NEW GUINEA, [East Sepik Prov.], Etappenberg [4°38'S 142°28'E], 800 m, 10.-12.XI.1912, leg. S. G. Bürgers; 1♀ (4/4) MFN: PAPUA NEW GUINEA, [East Sepik Prov.], Gratlager, 1050 m, 18.-20.VIII.1912, leg. S. G. Bürgers.

Additional material: 1♀ nymph MFN: PAPUA NEW GUINEA, [East Sepik Prov.], Gratlager, 1050 m, 18.-20.VIII.1912, leg. S. G. Bürgers.

Derivatio nominis: The species is named for the flattened pronotum. The specific epithet is Latin first and second declension adjective, 'depressus, -a, -um' in feminine gender, which is in fact participle of the passive voice of perfect tense of the verb 'deprimo, deprimere, depressi, depressum' - meaning to press down.

Description: Apical segments of the antennae brownish, other segments dark. No antennal segment broadly lamellate. Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together shorter than third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together as long as the fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) narrow and elongate. Sixth antennal segment from the






tip (segment 10 in ♀♀, 9 in ♂♂) as broad as third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex run parallel. Tip of the fastigium brightened. Median carina of the vertex deeper than the lateral carinae. Pronotum with broad yellow stripes. Last three segments of the visible part of the abdomen yellow. Measurements holotype ♂: pronotum length 7,93 mm, pronotum lobe width 3.25 mm, pronotum height 2.0 mm, hind femur length 8.71 mm, hind femur width 1.45 mm, vertex width 0.35 mm, eye width 0.68 mm, antenna length 7.67 mm, head length 4.50 mm, head index 1.3. Measurements paratypes 4♀: pronotum length (4♀): 8.71 - 10.92 mm, average 9.46 mm; pronotum lobe width (4♀): 3.6 - 4.35 mm, average 3.88 mm; pronotum height (4♀): 2.0 - 2.15 mm, average 2.10 mm; hind femur length (4♀): 9.1 - 9.88 mm, average 9.46 mm; hind femur width (4♀): 1.5 - 1.75 mm, average 1.64 mm; vertex width (4♀): 0.41 - 0.47 mm, average 0.44 mm; eye width (4): 0.64 - 0.70 mm, average 0.67 mm; antenna length (4♀): 8.45 - 10.01 mm, average 9.33 mm; head length (4♀): 4.45 - 5.36 mm, average 4.85 mm; head index (4♀): 1.23 - 1.68 mm, average 1.51 mm.

Differential diagnosis: *O. depressa* sp. nov. is one of the species with dark antennae and antennal segments with small margins but not lamellate or broadened. The other species of this group are: *O. scolopax* Bolívar, 1929, *O. bewana* sp. nov., *O. bomberaiensis* sp. nov., *O. filiforma* sp. nov., *O. luce* sp. nov., *O. mountnokensis* sp. nov. and *O. projecta* sp. nov. (listed here are members of Limosina species group, without *O. limosina*, species with rounded all the segments). *O. depressa* sp. nov. differs from *O. scolopax* in head index (>3 in *O. scolopax*) and in brightened tip of the fastigium. Also *O. filiforma* sp. nov. and *O. bewana* sp. nov. have dark tip of the fastigum. *O. depressa* sp. nov. differs from *O. luce* sp. nov. and *O. projecta* sp. nov. in the fifth antennal segment from the tip (segment 11 in ♀♀, 10 in ♂♂) morphology - straight or curved backwards. The fourth antennal segment from the tip is in *O. luce* sp. nov. is widened towards the tip. *O. projecta* sp. nov. has fastigium protruded in front of the eyes (in lateral view). In *O. bomberaiensis* sp. nov. the fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) is longer than the fifth antennal segment from the tip. In *O. bewana* sp. nov. and *O. mountnokensis* sp. nov. lateral carinae of the vertex are convergent to the tip, not parallel.

Distribution: Upper Sepik region, basin of the April River.

***Ophiotettix filiforma* sp. nov.** (Plate 105 figs 10-11, plate 109 figs 11-12, plate 113 figs 11-12, plate 117 figs 11-12, plate 121 fig. 7, plate 124 figs 4-5)

Holotype: ♂ BPBM: PAPUA NEW GUINEA, [East Sepik Prov.], Bainyik, nr. Maprik [3°40'S 143°03'E], 225 m, 20.–21.VI.1961, leg. J. L. & M. Gressitt.

Paratypes: 1♂ (1/18) BPBM: PAPUA NEW GUINEA, East Sepik Prov., Maprik [3°38'S 143°03'E], 160 m, 14.X.1957, leg. J. L. Gressitt, deposited in ZFMK (1/18); 1♀ (2/18) BPBM: PAPUA NEW GUINEA, East Sepik Prov., Maprik [3°38'S 143°03'E], 160 m, 15.X.1957, leg. J. L. Gressitt [antennae lost]; 1♀ (3/18) AMS: PAPUA NEW GUINEA, East Sepik Prov., Bainyik [3°40'S 143°03'E], 20.XII.1963, leg. D. K. McAlpine [antennae lost]; 1♂ (4/18) AMS: PAPUA NEW GUINEA, East Sepik Prov., Bainyik [3°40'S 143°03'E], 21.XII.1963, leg. D. K. McAlpine; 3♀, 5♂ (5/18–12/18) BPBM: INDONESIAN NEW GUINEA, Genjam, 40 km W of Hollandia [2°46'S 140°12'E], 100 - 200 m, 1.–10.III.1960, leg. T. C. Maa, deposited in NCB–RMNH (9/18) and BMNH (10/18), [1♀ antennae lost]; 1♀ (13/18) BPBM: PAPUA NEW GUINEA, Sepik Distr., Wewak [3°35'S 143°37'E], 30 m, 26.VI.1961, leg. J. L. & M. Gressitt, deposited in NCB–RMNH (13/18); 1♀ (14/18) BPBM: INDONESIAN NEW GUINEA, Bodem [1°58'S 138°44'E], 10.–17.VII.1959, leg. T. C. Maa, deposited in ZFMK (14/18); 1♂ (15/18) BPBM: INDONESIAN NEW GUINEA, Bodem, 11 km SE of Oerberfaren [1°58'S 138°44'E], 100 m, 7.–17.VII.1959, leg. T. C. Maa; 1♂ (16/18) BPBM: INDONESIAN NEW GUINEA, Waris, S. of Hollandia [3°11'S 140°53'E], 450 - 500 m, 1.–7.VIII.1959, leg. T. C. Maa; 1♀ (17/18) BPBM: INDONESIAN NEW GUINEA, Waris, S. of Hollandia [3°11'S 140°53'E], 450 - 500 m, 16.–23.VIII.1959, leg. T. C. Maa, deposited in ZFMK; 1♂ (18/18) BPBM: INDONESIAN NEW GUINEA, Waris, S. of Hollandia [3°11'S 140°53'E], 450 - 500 m, 24.–31.VIII.1959, leg. T. C. Maa.

Additional material: 1♀ BMNH: INDONESIAN NEW GUINEA, Njau–limon, 300 ft., II.1936, leg. L. E. Cheesman (NHMUK 10924621); 1♀ nymph, 2♂ nymphs BPBM: INDONESIAN NEW GUINEA, Genjam, 40 km W of Hollandia [2°46'S 140°12'E], 100 - 200 m, 1.–10.III.1960, leg. T. C. Maa. 1♂, INDONESIAN NEW GUINEA, Kali Biru, 2°30.866'S 140°08.739'E, 40 m, photos by David Price.

Note: Specimens from the Cyclops Mountains seem to be different species closely related in morphology to *O. filiforma* sp. nov. They have shorter antennae and apical segments differ in morphology. It is not possible here to describe those specimens as a new species until longer series from *O. filiforma* sp. nov. and from the Cyclops Mountains are gathered. Following specimens originated from Cyclops Mountains:

1♂ BPBM: INDONESIAN NEW GUINEA, Hollandia Area, W. Sentani, Cyclops Mountains, [2°36'S 140°37'E], 200–






1000 m, 16.–18.VI.1959, leg. J. L. Gressitt [antennae lost]; 1♀, 1♀ nymph BPBM: INDONESIAN NEW GUINEA, Hollandia Area, W. Sentani, Cyclops Mountains, [2°36'S 140°37'E], 150–250 m, 17.VI.1959, leg. J. L. Gressitt; 1♀, BPBM INDONESIAN NEW GUINEA, Hollandia Area, W. Sentani, Cyclops Mountains, [2°36'S 140°37'E], 150–250 m, 18.VI.1959, leg. J. L. Gressitt; 1♀ BPBM: INDONESIAN NEW GUINEA, Hollandia Area, W. Sentani, Cyclops Mountains, [2°36'S 140°37'E], 150–250 m, 18.VI.1959, leg. T. C. Maa; 1♀, 1♂ BPBM: INDONESIAN NEW GUINEA, Sentani, [2°36'S 140°37'E], 90+ m, 16.VI.1959, leg. T. C. Maa [♀ antennae lost]; 2♀ ZSM: INDONESIAN NEW GUINEA, Cyclops Mts., Jayapura, Sentani, [2°36'S 140°37'E], 300 m, 19.–21.IX.1990, leg. A. Riedel [antennae lost].

Derivatio nominis: The specific epithet is first and second. Latin declension adjective (filiformus, -a, -um) derived from the third Latin declension adjective (filiformis, -e). The species bears this epithet because of the filiform slender and elegant antennae.

Description: Antennal segments from dark (apical segments) to brownish (basal segments). No antennal segment broadened lamellate. Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together as long as third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together as long as fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) narrow and elongated. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) as broad as third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex run parallel. Tip of the fastigium dark with an exception (paratype 17/18 has bright fastigium). Median carina of the vertex as high as lateral carinae. Pronotum with broad yellow stripes. Visible part of the abdomen yellow or partially yellow. Dorsal margins of all legs yellow. Measurements holotype ♂: pronotum length 7.93 mm, pronotum lobe width 3.55 mm, pronotum height 1.90 mm, hind femur length 7.93 mm, hind femur width 1.45 mm, vertex width 0.35 mm, eye width 0.64 mm, antenna length 6.89 mm, head length 4.70 mm, head index 1.9. Measurements paratypes 8♀: pronotum length (8♀): 8.49 - 11.05 mm, average 9.92 mm; pronotum lobe width (8♀): 3.8 - 4.40 mm, average 4.09 mm; pronotum height (8♀): 1.85 - 2.30 mm, average 2.16 mm; hind femur length (8♀): 8.19 - 9.75 mm, average 9.10 mm; hind femur width (8♀) 1.6 - 1.75 mm, average 1.67 mm; vertex width (8♀): 0.37 - 0.47 mm, average 0.43 mm; eye width (8♀): 0.60 - 0.68 mm, average 0.65 mm; antenna length (4♀): 7.93 - 8.58 mm, average 8.29 mm; head length (8♀): 4.8 - 5.52 mm, average 5.22 mm; head index (8♀): 1.91 - 2.43 mm, average 2.17 mm. Measurements paratypes 11♂: pronotum length (11♂): 7.41 - 10.14 mm, average 8.20 mm; pronotum lobe width (11♂): 3.35 - 4.20 mm, average 3.62 mm; Pronotum height (11): 1.55 - 2.25 mm, average 1.90 mm; hind femur length (11♂): 7.67 - 8.45 mm, average 8.08 mm; hind femur width (11♂): 1.35 - 1.70 mm, average 1.51 mm; vertex width (11♂): 0.35 - 0.45 mm, average 0.41 mm; eye width (11♂): 0.59 - 0.66 mm, average 0.64 mm; antenna length (10♂): 6.89 - 8.19 mm, average 7.58 mm; head length (11♂): 4.5 - 5.28 mm, average 4.90 mm; head index (11♂): 1.78 - 2.19 mm, average 2.0 mm.

Differential diagnosis: *O. filiforma* sp. nov. is one of the species with dark antennae and antennal segments with small margins, not lamellate or broadened. Other species of this group are: *O. scolopax* Bolívar, 1929, *O. bewana* sp. nov., *O. bomberaiensis* sp. nov., *O. depressa* sp. nov., *O. luce* sp. nov., *O. mountnokensis* sp. nov. and *O. projecta* sp. nov. (all listed species, including *O. filiforma* sp. nov. are members of the Limosina species group, characteristic in slender antennae). Together with *O. scolopax* and *O. bewana* sp. nov., *O. filiforma* sp. nov. is the only species with dark tip of the fastigium. *O. filiforma* sp. nov. differs from *O. scolopax* in head index (>3 in *O. scolopax*) and from *O. bewana* by the parallel lateral carinae of the vertex. As in *O. projecta* sp. nov., in *O. filiforma* two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) are together as long as third apical segment (segment 13 in ♀♀, 12 in ♂♂). *O. projecta* sp. nov. differs by its fastigium protruded in front of the eyes (in lateral view).

Distribution: Lowland at the Northcoast of Indonesian New Guinea and Papua New Guinea.

***Ophiotettix flyriveriensis* sp. nov.** (Plate 105 figs 12-13, plate 109 figs 13-14, plate 113 figs 13-14, plate 121 figs 13-14, plate 121 fig. 8)

Holotype: ♂ BPBM: PAPUA NEW GUINEA, [Western Prov.], Kiunga [6°07'S 141°18'E], 35 m, VIII.1969, leg. J. & M. Sedlacek.

Paratypes: 5♀, 8♂ (1/24-13/24) BPBM: PAPUA NEW GUINEA, [Western Prov.], Kiunga [6°07'S 141°18'E], 35 m, VIII.1969, leg. J. & M. Sedlacek, deposited in NCB-RMNH (7/24), ZFMK (8/24) and BMNH (10/24) [5♀, 4♂ antennae lost]; 7♀ (14/24-20/24) BPBM: PAPUA NEW GUINEA, [Western Prov.], Olsobip [5°23'S 141°32'E], 400-600 m, VIII.1969, leg. J. & M. Sedlacek, deposited in BMNH (15/24) and NCB-RMNH (20/24) [4♀ antennae






lost]; 3♀ (21/24-23/24) BPBM: PAPUA NEW GUINEA, [Western Prov.], Olsobip [5°23'S 141°32'E], 400 m, 28.VIII.1969, leg. J. & M. Sedlacek, deposited in ZFMK (21/24) [1♀ antennae lost]; 1♀ (24/24) AMS: PAPUA NEW GUINEA, [Western Prov.], Matkomrae village approx 50 km N of Kiunga (5°49'S 141°09'E), 60 m, 3.X.1993, leg. M. S. Moulds & S. Cowan.

Additional material: 1♀, 1♂ nymph BPBM: PAPUA NEW GUINEA, [Western Prov.], Kiunga [6°07'S 141°18'E], 35 m, VIII.1969, leg. J. & M. Sedlacek [♀ head damaged].

Derivatio nominis: Toponymic. The species is named after the region of its type locality - the adjective was derived from 'Fly' + 'River+' + '-ensis'. The specific epithet is third Latin declension adjective in feminine gender (flyriveriensis, -e).

Description: Antennal segments dark. Third to sixth antennal segments (segments 10+11+12+13 in ♀♀, 9+10+11+12 in ♂♂) broadened lamellate. Two apical segments (segment 14+15 in ♀♀, 13+14 in ♂♂) together shorter than third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together as long as fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Outer margin of fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) lamellate and curved, with a tip at the inner dorsal margin. The dorsal 1/4 of this segment convergent towards the tip. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) broader than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Apical segments with narrow whitish bristles. Lateral carinae of the vertex run parallel. Tip of the fastigium brightened. Median carina of the vertex, in frontal view, deeper than lateral carinae. Pronotum with yellow stripes. Visible part of the abdomen partially yellow. Hind femora predominantly yellow. Apical segments of a specimen from Matkomrae village lighter brownish and narrower, neck somewhat narrower and more curved. Measurements are within the variation of *O. flyriveriensis* sp. nov. We assign this specimen to *O. flyriveriensis* sp. nov. More specimens from this region will show the true taxonomic and evolutionary status of the population. Measurements holotype ♂: pronotum length 8.71 mm, pronotum lobe width 3.45 mm, pronotum height 1.85 mm, hind femur length 8.97 mm, hind femur width 1.60 mm, vertex width 0.39 mm, eye width 0.68 mm, antenna length 10.40 mm, head length 5.05 mm, head index 1.92. Measurements paratypes 16♀: pronotum length (16♀): 8.45 - 10.53 mm, average 9.57 mm; pronotum lobe width (16♀): 3.6 - 4.20 mm, average 3.86 mm; pronotum height (16): 1.9 - 2.40 mm, average 2.17 mm; hind femur length (14): 8.84 - 10.27 mm, average 9.67 mm; hind femur width (14♀): 1.60 - 1.85 mm, average 1.70 mm; vertex width (16♀): 0.43 - 0.53 mm, average 0.49 mm; eye width (16♀): 0.64 - 0.74 mm, average 0.67 mm; antenna length (4♀): 8.32 - 10.27 mm, average 9.43 mm; head length (16♀): 5.04 - 5.68 mm, average 5.40 mm; head index (16♀): 1.75 - 2.09 mm, average 1.84 mm. Measurements paratypes 9♂: pronotum length (8♂): 8.32 - 9.10 mm, average 8.82 mm; pronotum lobe width (9♂): 3.4 - 3.65 mm, average 3.49 mm; pronotum height (9♂): 1.75 - 2.05 mm, average 1.90 mm; hind femur length (9♂): 8.84 - 9.62 mm, average 9.30 mm; hind femur width (9♂): 1.5 - 1.65 mm, average 1.57 mm; vertex width (9♂): 0.39 - 0.53 mm, average 0.48 mm; eye width (9♂): 0.62 - 0.72 mm, average 0.66 mm; antenna length (5♂): 9.23 - 10.79 mm, average 10.19 mm; head length (9♂): 4.96 - 5.52 mm, average 5.21 mm head index (9♂): 1.79 - 2.13 mm, average 1.94 mm.

Differential diagnosis: *O. flyriveriensis* sp. nov. is one of the species without pale coloured apical antennal segments, subapical antennal segments with lamellate inner margins and fifth antennal segment from the tip with straight or backwards curved dorsal margin. The dorsal 1/4 of the fourth antennal segment from the tip length parallel or convergent towards the tip and third antennal segment from the tip does not bear protruded tip. *O. flyriveriensis* sp. nov. is close in morphology to *O. lorentzi* Bolívar, 1929 (Lorentzi species group), *O. kaitani* sp. nov., *O. katharinae* sp. nov., *O. karimuiensis* sp. nov. and *O. quateorum* sp. nov. (Katharinae species group), but differs from those species by three apical antennal segments, which are together as long as fourth antennal segment from the tip.

Distribution: Upper Fly River in Western Province of Papua New Guinea.

***Ophiotettix fritzpahli* sp. nov.** (Plate 105 figs 14-15, plate 109 figs 15-16, plate 113 figs 15-16, plate 117 figs 15-16, plate 121 fig. 9)

Holotype ♂ NCB–RMNH: INDONESIAN NEW GUINEA, Araucaria Camp [3°30'S 139°11'E], 800 m, 7.III.1939, leg. L. J. Toxopeus.

Paratypes: 2♀ (1/18–2/18) NCB–RMNH: INDONESIAN NEW GUINEA, Rattan Camp [3°30'S 139°09'E], 1150 m, 13.II.1939, leg. L. J. Toxopeus [2/18 antennae lost]; 1♂ (3/18) NCB–RMNH: INDONESIAN NEW GUINEA, Rattan Camp [3°30'S 139°09'E], 1200 m, 14.II.1939, leg. L. J. Toxopeus, deposited in BMNH [antennae lost]; 1♂ (4/18) NCB–RMNH: INDONESIAN NEW GUINEA, Rattan Camp [3°30'S 139°09'E], 1200






m, 3.III.1939, leg. L. J. Toxopeus, deposited in BPBM [antennae lost]; 1♂ (5/18) NCB–RMNH: INDONESIAN NEW GUINEA, Rattan Camp [3°30'S 139°09'E], 1200 m, 5.III.1939, leg. L. J. Toxopeus [antennae lost]; 1♀ (6/18) NCB–RMNH: INDONESIAN NEW GUINEA, Araucaria Camp [3°30'S 139°11'E], 800 m, 3.III.1939, leg. L. J. Toxopeus, deposited in BMNH; 1♀ (7/18) NCB–RMNH: INDONESIAN NEW GUINEA, Araucaria Camp [3°30'S 139°11'E], 800 m, 4.III.1939, leg. L. J. Toxopeus [antennae lost]; 1♂, 1♀ nymph (8/18–9/18) NCB–RMNH: INDONESIAN NEW GUINEA, Araucaria Camp [3°30'S 139°11'E], 800 m, 6.III.1939, leg. L. J. Toxopeus [♂ antennae lost]; 2♀, 1♂ (10/18–12/18) NCB–RMNH: INDONESIAN NEW GUINEA, Araucaria Camp [3°30'S 139°11'E], 800 m, 12.III.1939, leg. L. J. Toxopeus, deposited in ZFMK (10/18 + 12/18), [1♀ antennae lost]; 1♀ (13/18) NCB–RMNH: INDONESIAN NEW GUINEA, Araucaria Camp [3°30'S 139°11'E], 800 m, 16.III.1939, leg. L. J. Toxopeus [antennae lost]; 1♀ (14/18) NCB–RMNH: INDONESIAN NEW GUINEA, Araucaria Camp [3°30'S 139°11'E], 800 m, 17.III.1939, leg. L. J. Toxopeus [antennae lost]; 1♀ (15/18) NCB–RMNH: INDONESIAN NEW GUINEA, Araucaria Camp [3°30'S 139°11'E], 800 m, 24.III.1939, leg. L. J. Toxopeus [antennae lost]; 1♀ (16/18) NCB–RMNH: INDONESIAN NEW GUINEA, Araucaria Camp [3°30'S 139°11'E], 800 m, 25.III.1939, leg. L. J. Toxopeus [antennae lost]; 1♀ (17/18) NCB–RMNH: INDONESIAN NEW GUINEA, Araucaria Camp [3°30'S 139°11'E], 800 m, 26.III.1939, leg. L. J. Toxopeus, deposited in BPBM; 1♀ (18/18) NCB–RMNH: INDONESIAN NEW GUINEA, Araucaria Camp [3°30'S 139°11'E], 800 m, 3.IV.1939, leg. L. J. Toxopeus [antennae lost].

Additional material: 1♀ nymph NCB–RMNH: INDONESIAN NEW GUINEA, Araucaria Camp [3°30'S 139°11'E], 800 m, 12.III.1939, leg. L. J. Toxopeus [antennae lost].

Derivatio nominis: Patronymic. The specific epithet is genitive case of the second Latin declension (-us declension) masculine noun derived from combination of name and surname (Fritzpahlus, -i, m.) The species is dedicated to late Fritz Pahl, a very good friend of Tumbrincks' family, who died in his 88th year in 2016.

Description: Apical segments of the antennae pale (third segment from the tip pale in more than half of its length and fourth segment from the tip only a little bit). No antennal segment with a clear tip at the inner margin, but antennal segments third to sixth from the tip (segments 10+11+12+13 in ♀♀, 9+10+11+12 in ♂♂) broadened and lamellate. Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together as long third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Outer margin of fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) lamellate and curved, with somewhat protruded edge at the inner dorsal margin. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) widened, with a recognizable edge, broader than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Apical segments with narrow whitish bristles. Lateral carinae of the vertex run parallel. Tip of the fastigium brightened. Median carina of the vertex, in frontal view, deeper than lateral carinae. Pronotum with yellow stripes. Hind femora and visible part of the abdomen partially yellow. Measurements holotype ♂: pronotum length 8.71 mm, pronotum lobe width 3.65 mm, pronotum height 2.15 mm, hind femur length 8.32 mm, hind femur width 1.65 mm, vertex width 0.49 mm, eye width 0.74 mm, antenna length 9.62 mm, head length 4.80 mm, head index 1.7. Measurements paratypes 12♀: pronotum length (12♀): 8.71 - 10.79 mm, average 10.11 mm; pronotum lobe width (12♀): 3.65 - 4.35 mm, average 4.09 mm; pronotum height (12♀): 2.2 - 2.65 mm, average 2.44 mm; hind femur length (10♀): 8.45 - 9.62 mm, average 9.28 mm; hind femur width (10♀): 1.65 - 1.85 mm, average 1.76 mm; vertex width (12♀): 0.47 - 0.57 mm, average 0.52 mm; eye width (12♀): 0.64 - 0.72 mm, average 0.68 mm; antenna length (3♀): 9.36 - 10.53 mm, average 9.92 mm; head length (12♀): 4.95 - 5.44 mm, average 5.22 mm; head index (12♀): 1.64 - 1.87 mm, average 1.73 mm. Measurements paratypes 6♂: pronotum length (6♂): 8.06 - 8.84 mm, average 8.56 mm; pronotum lobe width (6♂): 3.45 - 3.80 mm, average 3.60 mm; pronotum height (6♂): 1.7 - 2.15 mm, average 1.95 mm; hind femur length (4♂): 8.32 - 8.58 mm, average 8.45 mm; hind femur width (4♂): 1.5 - 1.65 mm, average 1.59 mm; vertex width (6♂): 0.43 - 0.51 mm, average 0.48 mm; eye width (6♂): 0.64 - 0.74 mm, average 0.68 mm; antenna length (2♂): 9.62 - 10.66 mm, average 10.14 mm; head length (6♂): 4.55 - 5.0 mm, average 4.80 mm; head index (6♂): 1.5 - 1.71 mm, average 1.64 mm.

Differential diagnosis: As a species with pale apical antennal segments and no antennal segment with a protruding tip at the inner margin *O. fritzpahli* sp. nov. (we tentatively put this species within Westwoodi species group but it shows intermediate characters between this group and Pulcherrima species group) is near to *O. pulcherrima* sp. nov. and *O. rebrinae* sp. nov. (both members of the Pulcherrima species group). It differs from these species easily deep vertex and dark tip of the






fastigium.
Distribution: Upper Mamberamo River.

***Ophiotettix hansscholteni* sp. nov.** (Plate 105 fig. 16, plate 109 figs 17-18, plate 113 figs 17-18, plate 117 figs 17-18, plate 121 fig. 10)

Holotype ♂ SMTD: PAPUA NEW GUINEA, [West Sepik Prov.], Torricelli Gebirge, 780 m, 1910, leg. Dr. Schlaginhaufen.
Paratypes: 1♀ (1/3) NCB–RMNH: PAPUA NEW GUINEA, [West Sepik Prov.], Torricelli Gebirge, 780 m, 1910, leg. Dr. Schlaginhaufen; 1♀ (2/3) SMTD: PAPUA NEW GUINEA, [West Sepik Prov.], Torricelli Gebirge, 780 m, 1910, leg. Dr. Schlaginhaufen; 1♂ (3/3) NCB–RMNH: PAPUA NEW GUINEA, [West Sepik Prov.], Torricelli Gebirge, 900 m, 1910, leg. Dr. Schlaginhaufen, deposited in ZFMK.
Additional material: 1♀, 1♂ BMNH: PAPUA NEW GUINEA, [West Sepik Prov.], 15 miles south of Paup [3°29'S 142°35'E], 1700 ft, 4.–12.III.1939, leg. G. P. Moore (NHMUK 010924586, NHMUK 010924585) [antennae damaged]; 1♂ BMNH: PAPUA NEW GUINEA, [West Sepik Prov.], 15 miles south of Paup [3°29'S 142°35'E], 1700 ft, 4.–12.III.1939, leg. G. P. Moore (NHMUK 010924592) [antennae lost].

Derivatio nominis: The specific epithet is second (-us) Latin declension noun in masculine gender, derived from the name and surname combination (Hannsscholtenus, -i, m.) The species is dedicated to Hans Scholten, the president of Naturschutzbund Deutschland (NABU) from 1984 - 1988.
Description: Antennal segments of dark brownish. No antennal segments lamellate. Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together as long as third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segment 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) narrow, widened towards the tip and with little bit protruded edge at the inner dorsal margin. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) as broad as third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Apical segments with narrow whitish bristles. Lateral carinae of the vertex run parallel. Lateral carinae of the vertex and median carina brightened. Vertex, in frontal view, flattened, median carina as high as lateral carinae. Pronotum with yellow lateral parts and infrascapular area. Visible part of the abdomen predominant yellow. Hind femur partially yellow. Measurements holotype ♂: pronotum length 8.45 mm, pronotum lobe width 3.50 mm, pronotum height 1.75 mm, hind femur length 8.45 mm, hind femur width 1.45 mm, vertex width 0.39 mm, eye width 0.66 mm, antenna length 7.80 mm, head length 5.12 mm, head index 1.91. Measurements paratype ♀ (1/3): pronotum length 11.05 mm, pronotum lobe width 4.25 mm, pronotum height 2.10 mm, hind femur length 9.23 mm, hind femur width 1.65 mm, vertex width 0.41 mm, eye width 0.68 mm, antenna length 9.23 mm, head length 5.60 mm, head index 2.13. Measurements paratype ♀ (2/3): pronotum length 10.01 mm, pronotum lobe width 4.25 mm, pronotum height 2.35 mm, hind femur length 9.49 mm, hind femur width 1.60 mm, vertex width 0.43 mm, eye width 0.68 mm, antenna length 8.45 mm, head length 5.60 mm, head index 2.08. Measurements paratype ♂ (3/3): pronotum length 8.06 mm, pronotum lobe width 3.55 mm, pronotum height 2.0 mm, hind femur length 8.71 mm, hind femur width 1.45 mm, vertex width 0.41 mm, eye width 0.72 mm, antenna length 7.54 mm, head length 5.20 mm, head index 2.26.
Differential diagnosis: Together with *O. parvicollis* sp. nov. (Brevicollis species group) this is the only species without lamellate antennal segments, but a small tip or protruding edge at the dorsal inner margin of fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂). It differs from this species easily by the longer neck (head index of *O. parvicollis* sp. nov. <1). This species is the only representative of the Hansscholteni species group.
Distribution: Torricelli Mountains.

***Ophiotettix imbiana* sp. nov.** (Plate 105 fig. 17, plate 109 fig. 19, plate 113 fig. 19, plate 117 fig. 19, plate 121 fig. 11)

Holotype ♂ AMS: PAPUA NEW GUINEA, [East Sepik Prov.], Imbia near Maprik [3°37'S 143°04'E], 19.XII1963, leg. D. K. McAlpine.

Derivatio nominis: the specific epithet is Latin first and second declension adjective derived from the type locality name (imbianus, -a. –um). The species is named after Imbia, its type locality.
Description: Antennal segments dark. Apical segments lighter brownish, but not pale (second antennal segment partially). Nodes of the basal antennal segments paler. Third to sixth antennal segments from the tip (segments 10+11+12+13 in ♀♀, 9+10+11+12 in ♂♂) broadened and lamellate. Fourth and fifth antennal segment with a clear tip at the inner margin (segments 11+12 in ♀♀, 10+11 in ♂♂). Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together shorter than third apical segment (segment 13 in ♀♀, 12 in






♂♂). Three apical segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Outer margin of fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) low, but distinctly lamellate and curved. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) widened, bearing a recognizable edge, as broad as third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex run parallel. Tip of the fastigium brightened. Median carina of the vertex, in frontal view, deeper than lateral carinae. Pronotum with yellow stripes. Hind femora and visible part of the abdomen partially yellow. Measurements holotype ♂: pronotum length 8.19 mm, pronotum lobe width 3.60 mm, pronotum height 1.60 mm, hind femur length 7.41 mm, hind femur width 1.50 mm, vertex width 0.33 mm, eye width 0.62 mm, antenna length 8.32 mm, head length 4.40 mm, head index 1.57.

Differential diagnosis: *O. imbiana* sp. nov. is one of the species without pale coloured apical antennal segments, subapical antennal segments with lamellate inner margins and fifth antennal segment from the tip with lateral edge projected into spine or acute angle. Sixth antennal segment from tip is not broadly lamellate. *O. imbiana* sp. nov. is close in morphology to *O. modesta* stat. rev., *O. rohwedderi* sp. nov., *O. schapinae* sp. nov. and *O. tenuis* sp. nov. all of the listed species are members of the Buergersi species group. *O. imbiana* sp. nov. differs from *O. schapinae* sp. nov. and *O. tenuis* sp. nov. by deep vertex. Sixth antennal segments from the tip is in *O. modesta* stat. rev. and *O. rohwedderi* sp. nov. not widened with recognizable edges as in *O. imbiana* sp. nov..

Distribution: Imbia near Maprik.

***Ophiotettix kaitani* sp. nov.** (Plate 106 figs 1-2, plate 110 figs 1-2, plate 114 figs 1-2, plate 118 figs 1-2, plate 121 fig. 12)

Holotype ♂, BYUC, PAPUA NEW GUINEA, Morobe Prov., Environment of Lae [6°44'S 146°58'E], VIII.1960, leg. J. Goddard.

Paratypes: 1♀ (1/13), BYUC, PAPUA NEW GUINEA, Morobe Prov., Environment of Lae [6°44'S 146°58'E], VIII.1960, leg. J. Goddard; 1♂ (2/13) ANIC: PAPUA NEW GUINEA, Morobe Prov., Lae, Bubia (native garden) [6°40' S 146°55'E], 6.VIII.1957, leg. J. H. Ardley; 1♀ (3/13) ANIC: PAPUA NEW GUINEA, Morobe Prov., Lae, Bubia (native garden) [6°40' S 146°55'E], 19.VIII.1957, leg. J. H. Ardley; 1♀ (4/13) ANIC: PAPUA NEW GUINEA, Morobe Prov., Lae, Bubia, 27.VIII.1957, leg. J. H. Ardley; 1♀ (5/13) BPBM: PAPUA NEW GUINEA, Morobe Prov., Lae, Busu River [6°43' S 147°03'E], 24.V.1968, leg. J. Sedlacek; 1 ♀ (6/13) BPBM: PAPUA NEW GUINEA, Morobe Prov., Lae, Busu River [6°43' S 147°03'E], 100 m, 15.IX.1955, leg. J. L. Gressitt, deposited in NCB–RMNH; 1♀ (7/13) BPBM: PAPUA NEW GUINEA, Morobe Prov., Lae Area, Bubia (Metroxylon) [6°40'S 146°55'E], 5 - 15 m, 22.VII.1959, leg. J. L. Gressitt; 1♀, 2♂ (8/13–10/13), PERC, PAPUA NEW GUINEA, Morobe Prov., Lae [6°44'S 146°58'E], VII.1944, leg. F. E. Skinner, deposited in ZFMK (10/18); 2♀ (11/13–12/13) BPBM: PAPUA NEW GUINEA, Morobe Prov., 6 mi. N. W. of Lae [6°40'S 146°55'E], 9.VIII.1957, leg. D. E. Hardy, deposited in ZFMK (11/13) and BMNH (12/18); 1♂ (13/13) BPBM: PAPUA NEW GUINEA, Morobe Prov., Zenag–Lae Road [6°45'S 146°40'E], 200 m, 17.I.1965, leg. J. Sedlacek.

Additional material [all specimens antennae lost]: 1♀ ANIC: PAPUA NEW GUINEA, Morobe Prov., Lae, Bubia (native garden) [6°40' S 146°55'E], 28.V.1957, leg. J. H. Ardley; 1♂ ANIC: PAPUA NEW GUINEA, Morobe Prov., Lae, Bubia (native garden), 28.VII.1957, leg. J. H. Ardley; 1♀ ANIC: PAPUA NEW GUINEA, Morobe Prov., Lae, Bubia (native garden) [6°40' S 146°55'E], 31.VII.1957, leg. J. H. Ardley; 1♂ ANIC: PAPUA NEW GUINEA, Morobe Prov., Lae, Bubia (native garden) [6°40' S 146°55'E], 6.VIII.1957, leg. J. H. Ardley; 1♀ BPBM: PAPUA NEW GUINEA, Morobe Prov., Lae, Busu River [6°43'S 147°03'E], 50 m, 14.I.1965, leg. J. Sedlacek; 3♀ BPBM: PAPUA NEW GUINEA, Morobe Prov., Lae, Bubia, Markham Valley [6°40'S 146°30'E], 50 m, 19.IX.1955, leg. J. L. Gressitt; 1♀, PAPUA NEW GUINEA, Morobe Prov., Lae [6°44'S 146°58'E], VII.1944, leg. F. E. Skinner (TUMBRINCK); 1♂ BPBM: PAPUA NEW GUINEA, Morobe Prov., Lae, Singuawa R. (6°41'S 147°10'E) (primary forest), 4.IV.1966, leg. Gressitt & Wilkes; 1♀ BPBM: PAPUA NEW GUINEA, Morobe Prov., Lae [6°44'S 146°58'E], 20 m, 11.IX.1962, leg. J. Sedlacek.

Derivatio nominis: The specific epithet is second Latin declension male noun in the genitive, derived from combination of name and surname (Kaitanus, -i, m.). The species in dedicated to our young colleague, Kai Ming Tan, famous entomologist (primarily orthopterist) from Singapore who has been making comprehensive revision of SE Asian taxa for a few years already.

Description: Antennal segments dark. Apical segments partially light brownish, but not pale. Fourth to sixth antennal segments (segment 11+12+13 in ♀♀, 10+11+12 in ♂♂) broadened and lamellate. Two apical segments (segment 14+15 in ♀♀, 13+14 in ♂♂) together shorter than third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segment 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). The dorsal 1/4 of fourth segment directed parallel towards the tip. Sixth antennal






segment from the tip (segment 10 in ♀♀, 9 in ♂♂) broader than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Apical segments with narrow whitish bristles. Lateral carinae of the vertex run parallel. Tip of the fastigium brightened. Median carina of the vertex, in frontal view, deeper than lateral carinae. Pronotum with yellow stripes. Visible part of the abdomen partially yellow. Hind femora predominantly yellow. Measurements holotype ♂: pronotum length 8.45 mm, pronotum lobe width 3.35 mm, pronotum height 1.95 mm, hind femur length 8.32 mm, hind femur width 1.55 mm, vertex width 0.31 mm, eye width 0.64 mm, antenna length 7.80 mm, head length 4.75 mm, head index 1.55. Measurements paratypes 9♀: pronotum length (9♀): 8.84 - 10.79 mm, average 9.58 mm; pronotum lobe width (9♀): 3.55 - 3.95 mm, average 3.72 mm; pronotum height (9♀): 1.95 - 2.40 mm, average 2.14 mm; hind femur length (9♀): 8.45 - 9.49 mm, average 8.93 mm; hind femur width (9♀): 1.65 - 1.75 mm, average 1.72 mm; vertex width (9♀): 0.33 - 0.43 mm, average 0.40 mm; eye width (9♀): 0.57 - 0.72 mm, average 0.64 mm; antenna length (9♀): 7.28 - 9.88 mm, average 8.62 mm; head length (9♀): 4.75 - 5.36 mm, average 4.93 mm; head index (9♀): 1.56 - 1.86 mm, average 1.70 mm. Measurements paratypes 5♂: Pronotum length (5♂): 7.8 - 8.97 mm, average 8.37 mm; pronotum lobe width (5♂): 3.25 - 3.49 mm, average 3.33 mm; pronotum height (5♂): 1.8 - 2.0 mm, average 1.90 mm; hind femur length (4♂): 8.06 - 8.32 mm, average 8.26 mm; hind femur width (4♂): 1.55 - 1.60 mm, average 1.56 mm; vertex width (5♂): 0.31 - 0.43 mm, average 0.39 mm; eye width (5♂): 0.59 - 0.64 mm, average 0.61 mm; antenna length (5♂): 7.8 - 9.10 mm, average 8.35 mm; head length (5♂): 4.5 - 4.75 mm, average 4.63 mm; head index (5♂): 1.55 - 1.90 mm, average 1.68 mm.

Differential diagnosis: *O. kaitani* sp. nov. is one of the species without pale coloured apical antennal segments, subapical antennal segments with lamellate inner margins and fifth antennal segment from the tip with dorsal margin straight or curved backwards. The dorsal 1/4 of the segment's length of fourth antennal segment from the tip directed parallel or convergent towards the tip, and third antennal segment from the tip without long protruded tip. *O. kaitani* sp. nov. is morphologically similar to *O. lorentzi* Bolívar, 1929 (Lorentzi species group), *O. flyriveriensis* sp. nov., *O. katharinae* sp. nov., *O. karimuiensis* sp. nov. and *O. quateorum* sp. nov. (Katharinae species group). The species can be distinguished from *O. lorentzi, O. katharinae* sp. nov. and *O. quateorum* sp. nov. by fourth antennal segment from the tip morphology - dorsal margin has more or less long and acute tip and is not straight or only with a protruding edge. It differs from *O. karimuiensis* sp. nov. by two apical antennal segments which are together shorter than third antennal segment from the tip (not as long as). It differs from *O. flyriveriensis* sp. nov. by three apical antennal segments together longer than fourth antennal segment from the tip (not as long as).

Distribution: Environment of Lae.

***Ophiotettix karimuiensis* sp. nov.** (Plate 106 figs 3-4, plate 110 figs 3-4, plate 114 figs 3-4, plate 118 figs 3-4, plate 121 fig. 13)

Holotype ♂ BPBM: PAPUA NEW GUINEA, Chimbu Prov., Karimui [6°30'S 144°51'E], 2.–3.VI.1961, leg. J. L. Gressitt.

Paratypes: 2♀ (1/22–2/22) BPBM: PAPUA NEW GUINEA, Chimbu Prov., Karimui [6°30'S 144°51'E], 2.–3.VI.1961, Malaise trap, leg. J. L. Gressitt, deposited in NCB–RMNH (1/22); 1♀ (3/22) BPBM: PAPUA NEW GUINEA, Chimbu Prov., Karimui [6°30'S 144°51'E], 3.VI.1961, leg. J. L. Gressitt; 1♂ (4/22) BPBM: PAPUA NEW GUINEA, Chimbu Prov., Karimui [6°30'S 144°51'E], 3.VI.1961, leg. J. L. & M. Gressitt, deposited in NCB–RMNH; 1♂ (5/22) BPBM: PAPUA NEW GUINEA, Chimbu Prov., Karimui [6°30'S 144°51'E], 4.VI.1961, leg. J. L. & M. Gressitt, deposited in BMNH; 1♀ (6/22) BPBM: PAPUA NEW GUINEA, Chimbu Prov., Karimui [6°30'S 144°51'E], 4.VI.1961, 1000 m, Malaise trap, leg. J. L. & M. Gressitt; 1♀, 3♂ (7/22–10/22) BPBM: PAPUA NEW GUINEA, Chimbu Prov., Karimui [6°30'S 144°51'E], 4.VI.1961, leg. J. L. Gressitt, deposited in NCB–RMNH (9/22); 2♀ (11/22–12/22) BPBM: PAPUA NEW GUINEA, Chimbu Prov., Karimui, South of Goroka, 1000 m, [6°30'S 144°51'E], 4.VI.1961, leg. J. L. & M. Gressitt, deposited in ZFMK (11/22); 6♀, 1 ♂ (13/22–19/22) BPBM: PAPUA NEW GUINEA, Chimbu Prov., Karimui, South of Goroka, 1000 m [6°30'S 144°51'E], 5.VI.1961, leg. J. L. & M. Gressitt, deposited in BMNH (18/22); 1♀ (20/22) BPBM: PAPUA NEW GUINEA, Chimbu Prov., Karimui, 1080 m [6°30'S 144°51'E], 8.–10.VII.1963, leg. J. Sedlacek; 1♀ (21/22) BPBM: PAPUA NEW GUINEA, Chimbu Prov., Karimui, 1080 m [6°30'S 144°51'E], 13.VII.1963, leg. J. Sedlacek; 1♂ (22/22) BPBM: PAPUA NEW GUINEA, Chimbu Prov., Mt. Karimui, 1000 m [6°30'S 144°51'E], 16.–20.IV.1977, leg. J. L. Gressitt.

Additional material [all adult specimens antennae lost]: 1♀ BPBM: PAPUA NEW GUINEA, Chimbu Prov., Karimui, South of Goroka, 1000 m [6°30'S 144°51'E], 2.VI.1961, leg. J. L. & M. Gressitt; 1♀, 1♂, 1♀ nymph BPBM: PAPUA NEW GUINEA, Chimbu Prov., Karimui [6°30'S 144°51'E], 2.–3.VI.1961, leg. J. L. Gressitt & M. Thompson; 1♀ nymph BPBM: PAPUA NEW GUINEA, Chimbu Prov., Karimui [6°30'S 144°51'E], 2.–3.VI.1961, Light Trap, leg. J. L. & M. Gressitt; 1♀, 2♂









BPBM: PAPUA NEW GUINEA, Chimbu Prov., Karimui [6°30'S 144°51'E], 2.–3.VI.1961, Malaise Trap, leg. J. L. Gressitt; 1♀ BPBM: PAPUA NEW GUINEA, Chimbu Prov., Karimui [6°30'S 144°51'E], 4.VI.1961, Malaise Trap, leg. J. L. & M. Gressitt; 1♀ BPBM: PAPUA NEW GUINEA, Chimbu Prov., Karimui, South of Goroka, 1000 m [6°30'S 144°51'E], 4.VI.1961, leg. J. L. & M. Gressitt; 4♀, 2♂, 1♂ nymph BPBM: PAPUA NEW GUINEA, Chimbu Prov., Karimui [6°30'S 144°51'E], 4.VI.1961, leg. J. L. Gressitt; 1♂ (20/22) BPBM: PAPUA NEW GUINEA, Chimbu Prov., Karimui, 1080 m [6°30'S 144°51'E], 8.–10.VII.1963, leg. J. Sedlacek.

Derivatio nominis: The specific epithet is third Latin declension adjective in feminine gender, derived from the type locality toponym (karimuiensis, -e), Karimui.

Description: Antennal segments dark brown. Fourth and fifth antennal segments from the tip (segments 12+13 in ♀♀, 11+12 in ♂♂) broadly lamellate. Only fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) with a distinct protruded tip at inner margin. Inner dorsal margin of fifth antennal segment from the tip (segment 11 in ♀♀, 10 in ♂♂) curved backwards. Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together as long as third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). The dorsal 1/4 of fourth segment parallel. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) narrower than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Apical segments with some narrow whitish bristles. Lateral carinae of the vertex run little bit convergent to the tip. Tip of the fastigium brightened. Median carina of the vertex, in frontal view, as high as lateral carinae. Pronotum with yellow stripes. Visible part of the abdomen and hind femora partially yellow. Measurements holotype ♂: pronotum length 7.80 mm, pronotum lobe width 3.25 mm, pronotum height 2.10 mm, hind femur length 7.93 mm, hind femur width 1.55 mm, vertex width 0.35 mm, eye width 0.66 mm, antenna length 7.80 mm, head length 4.65 mm, head index 1.73. Measurements paratype ♀ (13/22): pronotum length 8.71 mm, pronotum lobe width 3.35 mm, pronotum height 2.30 mm, hind femur length 9.10 mm, hind femur width 1.65 mm, vertex width 0.37 mm, eye width 0.68 mm, antenna length 8.58 mm, head length 5.20 mm, head index 1.65. Measurements paratypes 15♀: pronotum length (15♀): 7.93 - 9.49 mm, average 8.78 mm; pronotum lobe width (15♀): 3.15 - 3.95 mm, average 3.71 mm; pronotum height (15♀): 1.75 - 2.40 mm, average 2.01 mm; hind femur length (14♀): 8.71 - 9.23 mm, average 8.93 mm; hind femur width (14♀): 1.55 - 1.80 mm, average 1.69 mm; vertex width (15♀): 0.37 - 0.49 mm, average 0.46 mm; eye width (15♀): 0.62 - 0.68 mm, average 0.65 mm; antenna length (15♀): 8.19 - 9.36 mm, average 8.68 mm; head length (15♀): 4.88 - 6.08 mm, average 5.16 mm; head index (15♀): 1.66 - 2.05 mm, average 1.82 mm. Measurements paratypes 8♂: pronotum length (8♂): 7.41–7.80 mm, average y mm; pronotum lobe width (8♂): 3.15–3.40 mm, average 3.25 mm; pronotum height (8♂): 1.6–2.10 mm, average 1.83 mm; hind femur length (8♂): 7.54–8.71 mm, average 8.19 mm; hind femur width (8♂): 1.45–1.65 mm, average 1.52 mm; vertex width (8♂): 0.35–0.48 mm, average 0.41 mm; eye width (8♂): 0.39–0.68 mm, average 0.64 mm; antenna length (8♂): 7.8–9.10 mm, average 8.45 mm; head length (8♂): 4.56–4.88 mm, average 4.73 mm; head index (8♂): 1.45–1.76 mm, average 1.69 mm.

Differential diagnosis: *O. karimuiensis* sp. nov. is one of the species without pale coloured apical antennal segments, subapical antennal segments with lamellate inner margins and fifth antennal segment from the tip with straight or backwards curved dorsal margin. The dorsal 1/4 of the length of fourth antennal segment from the tip directed parallel or convergent towards the tip, and third antennal segment from the tip with long protruded tip. *O. karimuiensis* sp. nov. is morphologically similar to *O. lorentzi* (Lorentzi species group), *O. flyriveriensis* sp. nov., *O. kaitani* sp. nov., *O. katharinae* sp. nov. and *O. quateorum* sp. nov. (Katharinae species group). It differs from *O. lorentzi, O. katharinae* sp. nov. and *O. quateorum* sp. nov. by fourth antennal segment from the tip morphology - the dorsal margin has more or less long acute tip, not straight or with protruded edge. It differs from *O. kaitani* sp. nov. by two apical antennal segments together as long as third antennal segment from the tip (not shorter than). It differs from *O. flyriveriensis* sp. nov. by three antennal segments from the tip together longer than fourth antennal segment from the tip (not as long as).

Distribution: Karimui.

***Ophiotettix katharinae* sp. nov.** (Plate 106 figs 5-6, plate 110 figs 5-6, plate 114 figs 5-6, plate 118 figs 5-6, plate 121 fig. 14)

Holotype ♂ BMEC: PAPUA NEW GUINEA, Gulf Prov., Lakekamu Basin, Ivimka Res. Station, 120 m, 7°44'S 146°30'E, 14.IV.2000, Malaise trap, leg. T. A. Sears.









Paratypes: 2♀ (1/21–2/21) BMEC: PAPUA NEW GUINEA, Gulf Prov., Lakekamu Basin, Ivimka Res. Station, 120 m, 7°44'S 146°30'E, 2.–14.XI.1999, leg. S. L. Heyden, N. Schiffer & T. A. Sears; 1♀ (3/21) BMEC: PAPUA NEW GUINEA, Gulf Prov., Lakekamu Basin, Ivimka Res. Station, 120 m, 7°44'S 146°30'E, 3.–15.XI.1999, leg. S. L. Heyden, N. Schiffer & T. A. Sears; 1♀ (4/21) BMEC: PAPUA NEW GUINEA, Gulf Prov., Lakekamu Basin, Ivimka Res. Station, 120 m, 7°44'S 146°30'E, Malaise Trap, 19.–25.XI.1999, leg. T. A. Sears; 1♂ (5/21) BMEC: PAPUA NEW GUINEA, Gulf Prov., Lakekamu Basin, Ivimka Res. Station, 120 m, 7°44'S 146°30'E, Malaise Trap, 10.–12.II.2000, leg. T. A. Sears, deposited in ZFMK; 1♀ (6/21) BMEC: PAPUA NEW GUINEA, Gulf Prov., Lakekamu Basin, Ivimka Res. Station, 120 m, 7°44'S 146°30'E, 1.–10.III.2000, leg. T. A. Sears; 1♀ (7/21) BMEC: PAPUA NEW GUINEA, Gulf Prov., Lakekamu Basin, Ivimka Res. Station, 120 m, 7°44'S 146°30'E, 26.–30.III.2000, Malaise Trap, leg. T. A. Sears & binatung brigade, deposited in NCB–RMNH; 1♀ (8/21) BMEC: PAPUA NEW GUINEA, Gulf Prov., Lakekamu Basin, Ivimka Res. Station, 120 m, 7°44'S 146°30'E, 3.IV.2000, leg. T. A. Sears & binatung brigade; 2♀ (9/21–10/21) BMEC: PAPUA NEW GUINEA, Gulf Prov., Lakekamu Basin, Ivimka Res. Station, 120 m, 7°44'S 146°30'E, 6.IV.2000, leg. T. A. Sears; 1♀ (11/21) BMEC: PAPUA NEW GUINEA, Gulf Prov., Lakekamu Basin, Ivimka Res. Station, 120 m, 7°44'S 146°30'E, 13.IV.2000, Malaise Trap, leg. T. A. Sears; 1♀ (12/21) BMEC: PAPUA NEW GUINEA, Gulf Prov., Lakekamu Basin, Ivimka Res. Station, 120 m, 7°44'S 146°30'E, 18.IV.2000, leg. T. A. Sears; 2♀, 2♂ (13/21–16/21) BMEC: PAPUA NEW GUINEA, Morobe Prov., Tekadu, 120 m, 7°38'S 146°34'E, I.2000, Malaise Trap, leg. T. A. Sears & binatung brigade, deposited in BMNH (13/21, 14/21) and NCB–RMNH (16/21); 3♀ (17/21–19/21) BMEC: PAPUA NEW GUINEA, Morobe Prov., Tekadu, 120 m, 7°38'S 146°34'E, 1.–20.IV.2000, Malaise Trap, leg. T. A. Sears & binatung brigade; 1♀ (20/21) BMEC: PAPUA NEW GUINEA, Morobe Prov., Tekadu, 120 m, 7°38'S 146°34'E, 5.IV.2000, leg. T. A. Sears & binatung brigade, deposited in ZFMK; 1♀ (21/21) BMEC: PAPUA NEW GUINEA, Morobe Prov., sweep from Ivimka to Tekadu, 10.XI.1999, leg. T. A. Sears & binatung brigade. Additional material (antennae lost in all adult specimens): 1♂ nymph BMEC: PAPUA NEW GUINEA, Gulf Prov., Lakekamu Basin, Ivimka Res. Station, 120 m, 7°44'S 146°30'E, 16.–25.XI.1999, leg. T. A. Sears; 1♀ BMEC: PAPUA NEW GUINEA, Gulf Prov., Lakekamu Basin, Ivimka Res. Station, 120 m, 7°44'S 146°30'E, Malaise Trap, 19.–25.XI.1999, leg. T. A. Sears; 1♀ BMEC: PAPUA NEW GUINEA, Gulf Prov., Lakekamu Basin, Ivimka Res. Station, 120 m, 7°44'S 146°30'E, 5.–10.III.2000, Malaise trap, leg. T. A. Sears; 1♂ BMEC: PAPUA NEW GUINEA, Gulf Prov., Lakekamu Basin, Ivimka Res. Station, 120 m, 7°44'S 146°30'E, 21.III.2000, Malaise trap, leg. T. A. Sears; 1♀ BMEC: PAPUA NEW GUINEA, Gulf Prov., Lakekamu Basin, Ivimka Res. Station, 120 m, 7°44'S 146°30'E, 6.IV.2000, leg. T. A. Sears; 1♂ BMEC: PAPUA NEW GUINEA, Gulf Prov., Lakekamu Basin, Ivimka Res. Station, 120 m, 7°44'S 146°30'E, 18.IV.2000, Malaise Trap, leg. T. A. Sears; 1♀ BMEC: PAPUA NEW GUINEA, Gulf Prov., Lakekamu Basin, Ivimka Res. Station, 120 m, 7°44'S 146°30'E, 19.–23.IV.2000, Malaise Trap, leg. T. A. Sears; 1♀ BMEC: PAPUA NEW GUINEA, Morobe Prov., Tekadu, 120 m, 7°38'S 146°34'E, I.2000, Malaise Trap, leg. T. A. Sears & binatung brigade; 1♀ BMEC: PAPUA NEW GUINEA, Morobe Prov., Tekadu, 120 m, 7°38'S 146°34'E, 13.IV.2000, leg. T. A. Sears & binatung brigade.

Derivatio nominis: Patronymic. The specific epithet is genitive case female noun of Latin first (-a) declension, derived from name (Katharina, -ae, f.). The species is dedicated to Katharina Tumbrinck, wife of the first author that has been married to him already 22 years and is mother of two wonderful children. Let the coincidence be accidental, Katarina (Skejo) is also name of the second author's sister (the only difference in spelling being 't' vs digraph 'th'). Thus, for all wonderful Katharinas - 'Katharina's Giraffehopper'.

Description: Antennal segments dark brownish. Fourth and fifth antennal segments (segments 12+13 in ♀♀, 11+12 in ♂♂) broadly lamellate. Only fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) with protruded edge at inner margin. Inner dorsal margin of fifth antennal segment from the tip (segment 11 in ♀♀, 10 in ♂♂) straight. Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together shorter than third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). The dorsal 1/4 of fourth segment parallel. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) narrower than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Apical segments with some narrow whitish bristles. Lateral carinae of the vertex run parallel. Tip of the fastigium dark. Median carina of the vertex, in frontal view, deeper than lateral carinae. Pronotum with yellow stripes. Visible part of the abdomen and hind femora partially yellow. Measurements holotype ♂: pronotum length 8.58 mm, pronotum lobe width 3.55 mm, pronotum height 1.50 mm, hind femur length 8.84 mm, hind femur width 1.55 mm, vertex width 0.39 mm, eye width 0.68 mm, antenna length 9.10 mm, head length 4.95 mm, head index 1.74. Measurements paratypes 18♀: pronotum length (18♀): 8.84 - 11.18 mm, average 9.89 mm; pronotum lobe width (18♀): 3.7 - 4.45 mm, average 3.97 mm; pronotum height (18♀): 1.9









- 2.60 mm, average 2.15 mm; hind femur length (18♀): 8.06 - 10.53 mm, average 9.22 mm; hind femur width (18♀): 1.5 - 1.95 mm, average 1.77 mm; vertex width (18♀): 0.39 - 0.49 mm, average 0.44 mm; eye width (18♀): 0.62 - 0.72 mm, average 0.67 mm; antenna length (18♀): 7.67 - 11.05 mm, average 9.26 mm; head length (18♀): 4.8 - 5.52 mm, average 5.17 mm; head index (18♀): 1.41 - 1.92 mm, average 1.67 mm. Measurements paratypes 4♂: pronotum length (4♂): 7.93 - 8.58 mm, average 8.16 mm; pronotum lobe width (4♂): 3.3 - 3.55 mm, average 3.44 mm; pronotum height (4♂): 1.5 - 1.95 mm, average 1.71 mm; hind femur length (4♂): 8.06 - 8.84 mm, average 8.29 mm; hind femur width (4♂): 1.45 - 1.55 mm, average 1.53 mm; vertex width (4♂): 0.37 - 0.39 mm, average 0.39 mm; eye width (4♂): 0.64 - 0.68 mm, average 0.66 mm; antenna length (4♂): 7.45 - 9.10 mm, average 8.07 mm; head length (4♂): 4.48 - 4.95 mm, average 4.73 mm; head index (4♂): 1.48 - 1.74 mm, average 1.59 mm.

Differential diagnosis: *O. katharinae* sp. nov. is one of the species without pale coloured apical antennal segments, subapical antennal segments with lamellate inner margins and fifth antennal segment from the tip with straight or backwards curved dorsal margin. The dorsal 1/4 of the length of fourth antennal segment from the tip directed parallel or convergent towards the tip, and third antennal segment from the tip without long protruded tip. *O. katharinae* sp. nov. is morphologically close to *O. lorentzi* Bolívar, 1929 (Lorentzi species group), *O. flyriveriensis* sp. nov., *O. kaitani* sp. nov., *O. karimuiensis* sp. nov. and *O. quateorum* sp. nov. (Katharinae species group), but differs from them by dark tip of the fastigium.

Distribution: Upper basin of Lakekamu River.

***Ophiotettix luce* sp. nov.** (Plate 106 fig. 7, plate 110 fig. 7, plate 114 fig. 7, plate 118 fig. 7, plate 121 fig. 15)

Holotype ♀ NCB–RMNH: INDONESIAN NEW GUINEA, Pionierbivak [2°20'S 138°00'E], 20.XII.1920–I.1921, leg. W. C. v. Heurn.

Derivatio nominis: Patronymic. The specific epithet is female noun in Nominative case, first Latin declension (Luce, -ae, f.). The epithet is derived from Dalmatian nickname (Luce, one of the versions of Croatian diminutive Luca) of Lucija Šerić Jelaska, excellent Croatian entomologist (primarily carabidologist), molecular biologist, and ecologist. We are happy to dedicate this species in her honor. Lucija Šerić Jelaska bears similar name to previously mentioned heroine, Lucy Evelyn Cheesman.

Description: Antennal segments from dark (apical segments) to brownish (basal segments). No antennal segment broadly lamellate. Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together shorter than third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂) distinctly tapering from the middle to the tip. Fifth antennal segment from the tip (segment 11 in ♀♀, 10 in ♂♂) with straight dorsal margin. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) narrower than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex run parallel. Tip of the fastigium dark. Vertex flattened, median carina as high as lateral carinae. Pronotum with small dark stripes, but colouration remains uncertain. Measurements holotype ♀: pronotum length 9.10 mm, pronotum lobe width 6.0 mm, pronotum height 2.0 mm, hind femur length 8.58 mm, hind femur width 1.50 mm, vertex width 0.37 mm, eye width 0.64 mm, antenna length 8.0 mm, head length 5.0 mm, head index 1.86.

Differential diagnosis: *O. luce* sp. nov. is one of the species with dark antennae and antennal segments with minute margins, not broadly lamellate. Other species of this group are: *O. scolopax* Bolívar, 1929, *O. bewana* sp. nov., *O. bomberaiensis* sp. nov., *O. depressa* sp. nov., *O. filiforma* sp. nov., *O. mountnokensis* sp. nov. and *O. projecta* sp. nov. (all members of the Limosina species group, characteristic in slender antennae). *O. luce* sp. nov. is unique species within the group in having third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂) distinctly tapering from the middle towards the tip. In all other species lateral margins of this segment run parallel.

Distribution: Upper Mamberamo River.

***Ophiotettix meggy* sp. nov.** (Plate 106 fig. 8, plate 110 fig. 8, plate 114 fig. 8, plate 118 fig. 8, plate 121 fig. 16)

Holotype ♀ SMTD: PAPUA NEW GUINEA, West Sepik Prov., Torricelli Gebirge, 900 m, 1910, leg. Dr. Schlaginhaufen.

Derivatio nominis: Patronymic. The specific epithet is Nominative case noun in feminine gender, derived from Anglicized nickname






(Meggy, -ae, f.). The species is dedicated to Meggy Bofdružić, barmaid in Zagreb Department of Biology 'Kantina Medulich'. She was amazed by diversity of Giraffehoppers and very curious about our research.

Description: Apical segments of the antennae pale (third segment only a little bit). No antennal segments with clear tip at the inner margin but third to fifth antennal segments from the tip (segments 11+12+13 in ♀♀, 10+ 11+12 in ♂♂) broadened and lamellate. Fourth and fifth antennal segments (segments 12+13 in ♀♀, 11+12 in ♂♂) with a protruding edge. Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together as long as third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). The dorsal 1/4 of fourth segment somewhat widened towards the tip. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) narrower than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Apical segments with narrow whitish bristles. Lateral carinae of the vertex run parallel. Tip of the fastigium brightened. Median carina of the vertex, in frontal view, little bit deeper than lateral carinae. Pronotum without yellow stripes. Visible part of the abdomen and hind femora brownish. Only the lateral lobes yellow. Measurements holotype ♀: pronotum length 9.88 mm, pronotum lobe width 3.95 mm, pronotum height 2.35 mm, hind femur length 9.36 mm, hind femur width 1.55 mm, vertex width 0.29 mm, eye width 0.68 mm, antenna length 10.27 mm, head length 5.28 mm, head index 1.75.

Differential diagnosis: As a species with pale apical antennal segments and at least one antennal segment with protruded tip at the inner margin at fourth antennal segment from the tip *O. meggy* sp. nov. is similar to *O. westwoodi* stat. rev. and *O. cheesmanae* sp. nov. (all members of the Westwoodi species group). It differs from these species by flat vertex and fifth antennal segment from the tip that bears protruded edge.

Distribution: Torricelli Mountains.

***Ophiotettix mountnokensis* sp. nov.** (Plate 106 figs 9-10, plate 110 figs 9-10, plate 114 figs 9-10, plate 118 figs 9-10, plate 121 fig. 17)

Holotype ♂ BMNH: INDONESIAN NEW GUINEA, Waigeo, Mt. Nok, IV.1938, leg. L. E. Cheesman.

Paratypes: 7♀, 4♂ (1/12–11/12) BMNH: INDONESIAN NEW GUINEA, Waigeo, Mt. Nok, IV.1938, leg. L. E. Cheesman, deposited in ZFMK (2/12, 8/12), [1♀ 11/12 antennae lost]; 1♂ (12/12) BMNH: INDONESIAN NEW GUINEA, Waigeo, Camp Nok, 2500 ft., IV.1938, leg. L. E. Cheesman [antennae lost].

Additional material: 2♂ nymphs BMNH: INDONESIAN NEW GUINEA, Waigeo, Mt. Nok, IV.1938, leg. L. E. Cheesman; 1♀ nymph BMNH: INDONESIAN NEW GUINEA, Waigeo, Camp Nok, 2500 ft., IV.1938, leg. L. E. Cheesman.

Derivatio nominis: Toponymic. The specific epithet represents Nominative feminine adjective of the third Latin declension, derived from 'Mount' + 'Nok' + geographically - related suffix '-ensis' (mountnokensis, -e), meaning from Mount Nok, or can be regarded as noun, meaning - inhabitant of Mt. Nok - binomen literally meaning 'Giraffehopper of Mt. Nok'.

Description: Apical antennal segments lighter brownish. Other segments dark brownish. No antennal segment broadened and lamellate. Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together shorter than third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) as broad as third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex convergent towards the tip. Tip of the fastigium little bit brightened in the middle. Median carina of the vertex deeper than lateral carinae. Pronotum with small yellow stripes and a broad yellow saddle in front of prozona. Hind femora dark with some lighter patches. Measurements holotype ♂: pronotum length 8.97 mm, pronotum lobe width 4.25 mm, pronotum height 2.50 mm, hind femur length 10.92 mm, hind femur width 2.05 mm, vertex width 0.49 mm, eye width 0.70 mm, antenna length 10.92 mm, head length 4.88 mm, head index 1.4. Measurements paratypes 7♀: pronotum length (7♀): 10.14 - 11.96 mm, average 11.11 mm; pronotum lobe width (7♀): 4.5 - 5.10 mm, average 4.80 mm; pronotum height (7♀): 2.35 - 2.90 mm, average 2.68 mm; hind femur length (4♀): 10.92 - 11.70 mm, average 11.25 mm; hind femur width (4♀): 1.85 - 2.0 mm, average 1.94 mm; vertex width (7♀): 0.49 - 0.62 mm, average 0.56 mm; eye width (7♀): 0.68 - 0.74 mm, average 0.72 mm; antenna length (6♀): 11.7 - 12.87 mm, average 12.26 mm; head length (7♀): 5.44 - 5.84 mm, average 5.59 mm; head index (7♀): 1.54 - 1.79 mm, average 1.62 mm. Measurements paratypes 6♂: pronotum length (6♂): 8.97 - 10.14 mm, average 9.58 mm; pronotum lobe width (6♂): 4.1 - 4.35 mm, average









4.25 mm; pronotum height (6♂): 1.9 - 2.60 mm, average 2.23 mm; hind femur length (5♂): 10.14 - 10.92 mm, average 10.59 mm; hind femur width (5♂): 1.7 - 2.05 mm, average 1.79 mm; vertex width (6♂): 0.47 - 0.55 mm, average 0.50 mm; eye width (6♂): 0.68 - 0.70 mm, average 0.69 mm; antenna length (5♂): 10.92 - 12.09 mm, average 11.49 mm; head length (6♂): 4.88 - 5.15 mm, average 5.04 mm; head index (6♂): 1.4 - 1.60 mm, average 1.52 mm.

Differential diagnosis: *O. mountnokensis* sp. nov. is one of the species with dark antennas having small margins, but not being lamellate or broadened. Other species of this group are: *O. scolopax* Bolívar, 1929, *O. bewana* sp. nov., *O. bomberaiensis* sp. nov., *O. depressa* sp. nov., *O. filiforma* sp. nov., *O. luce* sp. nov. and *O. projecta* sp. nov. (this is Limosina species group, without *O. limosina* (Snellen van Vollenhoven, 1865), species in which all the segments are rounded in cross section). *O. mountnokensis* sp. nov. differs from all other species in the group (except for *O. depressa* sp. nov.) by deep vertex (median carina deeper than lateral carinae). From *O. depressa* sp. nov. it is easily separated by convergent lateral carinae. In no other *Ophiotettix* species we found a broadened yellow saddle over the pronotum, but it is uncertain if this character of somewhat elevated chitinous structure of discus and colouration is useful for taxonomy and what is its purpose.

Distribution: Mount Nok on the island of Waigeo.

***Ophiotettix parvicollis* sp. nov.** (Plate 106 figs 11-12, plate 110 figs 11-12, plate 114 figs 11-12, plate 118 figs 11-12, plate 121 fig. 18)

Holotype ♂ BPBM: PAPUA NEW GUINEA, Kassem Pass, 1400–1430 m, 4.IX.1964, leg. J. & M. Sedlacek.

Paratypes: 1♀ (1/5) BPBM: PAPUA NEW GUINEA, Kassem Pass, 1400 m, 4.I.1965, leg. J. & M. Sedlacek, deposited in NCB–RMNH [antennae damaged]; 1♀ (2/5) BPBM: PAPUA NEW GUINEA, 20–22 km SE Okapa, 2100–2250 m, 24.VIII.1964, leg. J. & M. Sedlacek deposited in ZFMK [antennae lost]; 1♀ (3/5) BPBM: PAPUA NEW GUINEA, Purosa, 20–26 km SE Okapa [6°40'S 145°34'E], 1800–2020 m, 28.VIII.1964, leg. J. & M. Sedlacek [antennae lost]; 1♀ (4/5) BPBM: PAPUA NEW GUINEA, 18 km SE of Okapa [6°38'S 145°44'E], 1300 m, 31.V.1967, leg. G. A. Samuelson, deposited in BMNH [antennae lost]; 1♀ (5/5) BPBM: PAPUA NEW GUINEA, [Eastern Highland Prov.], Aiyura, nr. Kainantu [6°20'S 145°54'E], 1700–1800 m, 9.I.1965, leg. J. L. Gressitt.

Derivatio nominis: Specific epithet is combination of two Latin words, one adjective and a noun - 'parvi-' being borrowed from first and second declension adjective 'parvus, -a, -um', meaning small, while 'collis' is ablative plural of the neuter gender second (-us) declension noun 'collum, -i, n.' meaning neck. Whole epithet thus means 'Giraffehopper of small necks'. The species is named this way because of the short head, shortest of all known species.

Description: Together with *O. roesleri* sp. nov. this is the smallest *Ophiotettix* species. It is also species of the shortest neck (head index <0.9). All antennal segments brownish. No antennal segment with a clear tip at the inner margin, but third and fourth antennal segments from the tip (segments 12+13 in ♀♀, 11+12 in ♂♂) little bit lamellate, with a distinct edge. Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together longer than third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) widened towards the tip. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) narrower than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex run parallel. Tip of the fastigium dark. Median carina of the vertex, in frontal view, little bit deeper than lateral carinae. Fastigium narrow. Tip of the fastigium, in lateral view, little bit protruding in front of the eyes. Pronotum without or with interrupted yellow stripes. Visible part of the abdomen and hind femora predominantly yellow. Measurements holotype ♂: pronotum length 6.0 mm, pronotum lobe width 3.20 mm, pronotum height 1.75 mm, hind femur length 6.08 mm, hind femur width 1.20 mm, vertex width 0.23 mm, eye width 0.57 mm, antenna length 5.92 mm, head length 3.25 mm, head index 0.68. Measurements paratypes 5♀: pronotum length (5♀): 7.15 - 8.45 mm, average 7.93 mm; pronotum lobe width (5♀): 3.8 - 4.0 mm, average 3.90 mm; pronotum height (5♀): 2.0 - 2.25 mm, average 2.17 mm; hind femur length (4♀): 6.63 - 7.41 mm, average 7.18 mm; hind femur width (4♀): 1.5 - 1.75 mm, average 1.65 mm; vertex width (5♀): 0.25 - 0.31 mm, average 0.27 mm; eye width (5♀): 0.59 - 0.64 mm, average 0.62 mm; antenna length (1♀): 5.59 mm; head length (5♀): 3.55 - 3.90 mm, average 3.72 mm; head index (5♀): 0.65 - 0.90 mm, average 0.81 mm.

Differential diagnosis: Together with *O. hansscholteni* sp. nov. (Hansscholteni species group) the only species without lamellate antennal









segments but little bit tip or protruding edge at the dorsal inner margin of fourth antennal segment from the tip. It differs from this species by much shorter neck (head index of *O. parvicollis* sp. nov. <1). it belongs to the species group composed of species with short neck - Brevicollis species group.
Distribution: Eastern Highlands Province.

***Ophiotettix projecta* sp. nov.** (Plate 106 fig. 13, plate 110 fig. 13, plate 114 fig. 13, plate 118 fig. 13, plate 121 fig. 19)
Holotype ♂ MFN: PAPUA NEW GUINEA, [East Sepik Prov.], Standlager am Aprilfluss [4°32'S 142°29'E], 24.X.1912, leg. S. G. Bürgers.
Paratype: 1♀ (1/1) MFN: PAPUA NEW GUINEA, [East Sepik Prov.], Standlager am Aprilfluss [4°32'S 142°29'E], 24.X.1912, leg. S. G. Bürgers.

Derivatio nominis: The specific epithet is Nominative case feminine gender adjective (projectus, -a, -um), which is in fact participle of the passive voice of perfect tense of the third conjugation verb 'projicio, projicere, projeci, projectum', with meaning - in this case particularly - to protrude (other meanings are also to throw out, to abandon). The species is named with this epithet of this name because of being the only species in the Limosina species group with partially projected vertex.
Description: Antennal segments from dark (apical segments) to brownish (basal segments). No antennal segment broadly lamellate. Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together as long as third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) with little bit protruding edge, but not broadly lamellate. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) as broad as third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex run parallel. Tip of the fastigium dark. Vertex flat, median carina as high as lateral carinae. Pronotum with yellow stripes. Hind femora and visible part of the abdomen partially yellow. Measurements holotype ♂: pronotum length 8.45 mm, pronotum lobe width 3.65 mm, pronotum height 1.90 mm, hind femur length 8.32 mm, hind femur width 1.60 mm, vertex width 0.41 mm, eye width 0.59 mm, antenna length 7.02 mm, head length 4.90 mm, head index 2.05. Measurements holotype ♀ (1/1): pronotum length 8.58 mm, pronotum lobe width 4.10 mm, pronotum height 2.25 mm, hind femur length 9.36 mm, hind femur width no measurements, vertex width 0.39 mm, eye width 0.59 mm, antenna length no measurements, head length 4.90 mm, head index 2.2.
Differential diagnosis: *O. projecta* sp. nov. is one of the species with dark antenna and segments with small margins, but not lamellate or broadened. Other species of this group are: *O. scolopax*, *O. bewana* sp. nov., *O. bomberaiensis* sp. nov., *O. depressa* sp. nov., *O. filiforma* sp. nov., *O. luce* sp. nov. and *O. mountnokensis* sp. nov. (all members of the Limosina species group, characterized in slender antennae). *O. projecta* sp. nov. is unique in this group because of the tip of the fastigium which being protruded in front of the eyes.
Distribution: Upper Sepik at April River.

***Ophiotettix pulcherrima* sp. nov.** (Plate 106 fig. 14, plate 110 fig. 14, plate 114 figs 14-15, plate 118 figs 14-15, plate 121 fig. 20, plate 123 figs 1, 3-4)
Holotype ♂ ZSM: INDONESIAN NEW GUINEA, Yapen Island, Serui, Mantembo [Mantembu, 1°51'S 136°15'E], 200–700 m, 6.IX.1991, leg. A. Riedel.
Paratypes: 1♂ (1/8) BPBM: INDONESIAN NEW GUINEA, Yapen Island, SSE Sumberbaba, Dawai R. (jungle) [1°49'S 136°41'E], 10.X.1962, leg. H. Holtmann [antennae lost]; 1♂ (2/8) BPBM: INDONESIAN NEW GUINEA, Yapen Island, SSE Sumberbaba, Dawai R. (jungle) [1°49'S 136°41'E], 28.X.1962, leg. H. Holtmann (antennae damaged); 1♀ (3/8) BPBM: INDONESIAN NEW GUINEA, Yapen Island, SSE Sumberbaba, Dawai R. (secondary jungle) [1°49'S 136°41'E], 2.XI.1962, leg. H. Holtmann; 1♂ (4/8) BMNH: INDONESIAN NEW GUINEA, Yapen, Seroi, Aiam Range, Mt. Baduri, Camp 1, 1000 ft., IX.1938, leg. L. E. Cheesman; 1♀ (5/8) MSNG: INDONESIAN NEW GUINEA, [Schouten Islands, Yapen], Ansus [Ansas, 1°43'S 135°50'E], IV.1875, leg. Beccari; 1♀ (6/8) NCB–RMNH: INDONESIAN NEW GUINEA, Bernhard Camp B. [3°29'S 139°13'E], 100 m, 10.IV.1939, leg. L. J. Toxopeus; 1♂ (7/8) NCB–RMNH: INDONESIAN NEW GUINEA, Bernhard Camp [3°29'S 139°13'E], 50 m, VIII.1938, leg. J. Olthof; 1♂ (8/8) NCB–RMNH: INDONESIAN NEW GUINEA, Bernhard Camp [3°29'S 139°13'E], 50 m, 19.IX.1938, leg. J. Olthof, deposited in ZFMK.
Additional material: 1♀ SMTD: INDONESIAN NEW GUINEA, Prauwenbivak [3°15'S 138°35'E], VI.–VII.1920, leg. W. C. v. Hoorn (photos Orthoptera species files, not seen); 1♀ NCB–RMNH: INDONESIAN NEW GUINEA, Mountain slope above Bernhard Camp [3°29'S 139°13'E], 750 m, 19.III.1939, leg. L. J. Toxopeus [antennae lost]; 2♀ NCB–RMNH: INDONESIAN NEW GUINEA, Bernhard Camp [3°29'S 139°13'E], 50 m, VIII.1938, leg. J. Olthof [antennae lost]; 1♀ nymph NCB–






RMNH: INDONESIAN NEW GUINEA, Bernhard Camp [3°29'S 139°13'E], 50 m, 27.IX.1938, leg. J. Olthof; 1♀, 1♂, INDONESIAN NEW GUINEA, Yapen, Warironi Village, 1°51.293'S 136°32.614'E, photos by David Price.

Derivatio nominis: The specific epithet is nominative case feminine gender Latin adjective in superlative (from pulcher, -ra, -um to pulcherrimus –a, -um, meaning beautiful, neat). The species is named because of its beauty. A literal translation of the binomen would be 'Very neat giraffehopper'.
Description: Apical segments of the antennae pale (third segment from the tip in more than half of it length and fourth segment only little bit from the tip). No antennal segments with clear tip at the inner margin, but third to fifth antennal segments from the tip (segments 11+12+13 in ♀♀, 10+11+12 in ♂♂) a little bit lamellate and fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) with distinct minute protruding edge at the inner margin. Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) little bit convergent towards the tip. Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together shorter than third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) narrower than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex run parallel. Tip of the fastigium brightened. Median carina of the vertex, in frontal view, little bit deeper than lateral carinae. Pronotum with yellow and white stripes. Hind femora and visible part of the abdomen partially yellow. Measurements holotype ♂: pronotum length 8.29 mm, pronotum lobe width 3.67 mm, pronotum height 2.10 mm, hind femur length 8.24 mm, hind femur width 1.52 mm, vertex width 0.42 mm, eye width 0.68 mm, antenna length 9.42 mm, head length 5.46 mm, head index 1.94. Measurements paratypes 3♀: pronotum length (3♀): 10.79 - 11.70 mm, average 11.27 mm; pronotum lobe width (3♀): 4.25 - 4.40 mm, average 4.35 mm; pronotum height (3♀): 2.33 - 2.40 mm, average 2.36 mm; hind femur length (2♀): 9.88 - 10.27 mm, average 10.08 mm; hind femur width (2♀): 1.75 - 1.80 mm, average 1.78 mm; vertex width (3♀): 0.41 - 0.45 mm, average 0.43 mm; eye width (3♀): 0.62 - 0.68 mm, average 0.66 2 mm; antenna length (3♀): 8.45 - 9.23 mm, average 8.75 mm; head length (3♀): 5.44 - 6.23 mm, average 5.84 mm; head index (3♀): 2.0 - 2.08 mm, average 2.05 mm. Measurements paratypes 6♂: pronotum length (6♂): 8.29 - 9.36 mm, average 8.90 mm; pronotum lobe width (6♂): 3.6 - 3.75 mm, average 3.67 mm; pronotum height (6♂): 1.8 - 2.25 mm, average 2.05 mm; hind femur length (5♂): 8.24 - 9.36 mm, average 8.82 mm; hind femur width (5♂): 1.5 - 1.65 mm, average 1.55 mm; vertex width (6♂): 0.39 - 0.45 mm, average 0.42 mm; eye width (6♂): 0.62 - 0.68 mm, average 0.66 mm; antenna length (4♂): 8.19 - 9.49 mm, average 8.95 mm; head length (6♂): 4.96 - 6.36 mm, average 5.38 mm; head index (6♂): 1.94 - 2.21 mm, average 2.05 mm.
Differential diagnosis: As a species with pale apical antennal segments and no antennal segment with a protruding tip at the inner margin *O. pulcherrima* sp. nov. (Pulcherrima species group) is near to *O. fritzpahli* sp. nov. (Wesdtwoodi species group) and *O. rebrinae* sp. nov. (Pulcherrima species group). It differs from *O. rebrinae* sp. nov. by pale colouration in the beginning of fourth antennal segment from the tip and from *O. fritzpahli* sp. nov. by flat vertex and brightened tip of the fastigium.
Distribution: Yapen Island and Mamberamo River basin on mainland New Guinea.

***Ophiotettix pushkari* sp. nov.** (Plate 107 figs 1-2, plate 111 figs 1-2, plate 115 figs 1-2, plate 119 figs 1-2, plate 121 fig. 21)

Holotype ♂ BPBM: INDONESIAN NEW GUINEA, Vogelkop, Kebar Valley, W. of Manokwari [0°49'S 133°01'E], 550 m, 4.–31.I.1962, leg. L. W. Quate.
Paratype: 1♀ (1/1) BPBM, INDONESIAN NEW GUINEA Vogelkop, Kebar Valley, W. of Manokwari [0°49'S 133°01'E], 550 m, 4.–31.I.1962, leg. L. W. Quate, deposited in ZFMK.
Additional material: 1♀ nymph BPBM: INDONESIAN NEW GUINEA, Vogelkop, Kebar Valley, W. of Manokwari [0°49'S 133°01'E], 550 m, 4.–31.I.1962, leg. L. W. Quate.

Derivatio nominis: Patronymic. The specific epithet is the genitive case of the male noun of second (-us) Latin declension, derived from surname (Pushkarus, -i, m.) The species is dedicated to our friend and colleague, Taras I. Pushkar, orthopterist (and also tetrigidologist) from Ukraine. He helped us and collaborated with us a lot on Tetrigidae issues and we are very happy to dedicate this species in Taras' honour.
Description: Apical and subapical segments of the antennae black, other segments brownish. Third to fifth antennal segments from the tip (segments 11+12+13 in ♀♀, 10+11+12 in ♂♂) like a "cup", with a long tip at the inner margin of antennal






segments four and five counted from the tip. The dorsal 1/3 of fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) convergent towards the tip. Two apical segments (segment 14+15 in ♀♀, 13+14 in ♂♂) together as long as third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segment 13+14+15 in ♀♀, 12+13+14 in ♂♂) together shorter than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) narrow than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex run parallel. Tip of the fastigium dark. Median carina of the vertex, in frontal view, as high as lateral carinae. Pronotum with reddish to yellow stripes. Hind femora and visible part of the abdomen partially reddish or yellow. Measurements holotype ♂: pronotum length 8.45 mm, pronotum lobe width 3.20 mm, pronotum height 1.65 mm, hind femur length 7.44 mm, hind femur width 1.60 mm, vertex width 0.43 mm, eye width 0.66 mm, antenna length 6.89 mm, head length 4.25 mm, head index 1.43. Measurements paratype ♀: pronotum length 8.97 mm, pronotum lobe width 3.50 mm, pronotum height 2.20 mm, hind femur length 8.0 mm, hind femur width 1.65 mm, vertex width 0.45 mm, eye width 0.59 mm, antenna length 7.76 mm, head length 4.50 mm, head index 1.33.

Differential diagnosis: *O. pushkari* sp. nov. is one of the species without pale coloured apical antennal segments, subapical antennal segments with lamellate inner margins and third antennal segment from the tip with a distinctly protruded long tip at the inner margin. *O. pushkari* sp. nov. is near to *O. cygnicollis* Walker, 1871, *O. amberiana* sp. nov., *O. storozhenkoi* sp. nov. (together with *O. pushkari* sp. nov. members of the Cygnicollis species group) and *O. toxopei* sp. nov. (Toxopei species group). *O. toxopei* sp. nov. is unique in having a widened third antennal segment from the tip. *O. pushkari* sp. nov. differs from *O. cygnicollis* and *O. amberiana* sp. nov. in morphology of the fourth and fifth antennal segments from the tip, which are less than twice as wide as the second segment from the tip. It differs from *O. storozhenkoi* sp. nov. by the flat vertex.

Distribution: Kebar Valley.

***Ophiotettix quateorum* sp. nov.** (Plate 107 figs 3-5, plate 111 figs 3-4, plate 115 figs 3-4, plate 119 figs 3-4, plate 122 fig. 4)

Holotype ♀ BPBM: INDONESIAN NEW GUINEA, [Star Mountains], Sibil Valley [4°45'S 140°40'E], 1245 m, 18.X.–8.XI.1961, leg. L. W. Quate.

Paratypes: 5♀, 3♂ (1/8–8/8) BPBM: INDONESIAN NEW GUINEA, [Star Mountains], Sibil Valley [4°45'S 140°40'E], 1245 m, 18.X.–8.XI.1961, leg. S. or L. W. Quate, deposited in ZFMK (1/8, 8/8), NCB–RMNH (2/8) and BMNH (5/8) [4♀, 2♂ antennae lost].

Additional material: 1♀ nymph, 1♂ nymph BPBM: INDONESIAN NEW GUINEA, [Star Mountains], Sibil Valley [4°45'S 140°40'E], 1245 m, 18.X.–8.XI.1961, leg. S. Quate and L. W. Quate.

Derivatio nominis: Patronymic. The specific epithet is the plural genitive case of the second (-us) Latin declension of the female or male noun derived from a surname (Quateus, -i, m./f.). The species is dedicated to its collectors, entomologists Stella H. Quate and Lawrence W. Quate - specialized in Psychodidae. A literal translation of the specific name is 'Giraffehopper of Quates'

Description: Apical and subapical segments of the antennae black, the other segments brownish. Fourth and fifth antennal segments from the tip (segments 12+13 in ♀♀, 11+12 in ♂♂) little bit lamellate, with small protruding inner margin of fourth antennal segment from the tip. The dorsal 1/4 of fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) somewhat convergent towards the tip. Inner edge of the dorsal margin of fifth antennal segment from the tip (segment 11 in ♀♀, 10 in ♂♂) directed backwards. Two apical segments (segment 14+15 in ♀♀, 13+14 in ♂♂) together as long as third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segment 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) narrower than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex run parallel. Tip of the fastigium brightened. Median carina of the vertex, in frontal view, as high as lateral carinae. Pronotum with yellow stripes. Hind femora partially yellow. Visible part of the abdomen partially whitish. Measurements holotype ♀: pronotum length 7.28 mm, pronotum lobe width 3.25 mm, pronotum height 1.95 mm, hind femur length 7.80 mm, hind femur width 1.40 mm, vertex width 0.31 mm, eye width 0.64 mm, antenna length 6.63 mm, head length 4.30 mm, head index 1.65. Measurements paratypes 6♀: pronotum length (6♀): 7.15 - 7.54 mm, average 7.35 mm; pronotum lobe width (6♀): 3.1 - 3.40 mm, average 3.23 mm; pronotum height (6♀): 1.7 - 2.30 mm, average 1.92 mm; hind femur length (3♀): 7.54 - 7.80 mm, average 7.63 mm; hind femur width (3♀): 1.4 - 1.40 mm,









average 1.40 mm; vertex width (6♀): 0.31 - 0.35 mm, average 0.32 mm; eye width (6♀): 0.61 - 0.68 mm, average 0.64 mm; antenna length (2♀): 6.63 - 7.15 mm, average 6.89 mm; head length (6♀): 4.2 - 4.70 mm, average 4.40 mm; head index (6♀): 1.4 - 1.65 mm, average 1.53 mm. Measurements paratypes 3♂: pronotum length (3♂): 5.98 - 6.11 mm, average 6.07 mm; pronotum lobe width (3♂): 2.3 - 2.90 mm, average 2.58 mm; pronotum height (3♂): 1.6 - 1.70 mm, average 1.65 mm; hind femur length (2♂): 6.76 - 6.76 mm, average 6.76 mm; hind femur width (2♂): 1.15 - 1.25 mm, average 1.20 mm; vertex width (3♂): 0.31 - 0.33 mm, average 0.32 mm; eye width (3♂): 0.51 - 0.62 mm, average 0.57 mm; antenna length (2♂): 5.85 - 6.89 mm, average 6.37 mm; head length (3♂): 3.9 - 4.05 mm, average 4.0 mm; head index (3♂): 1.36 - 1.50 mm, average 1.44 mm.

Differential diagnosis: *O. quateorum* sp. nov. is one of the species without pale coloured apical antennal segments, subapical antennal segments with lamellate inner margins and fifth antennal segment from the tip with dorsal margin straight or curved backwards. The dorsal 1/4 of the length of fourth antennal segment from the tip parallel or convergent towards the tip and third antennal segment without protruding tip. *O. quateorum* sp. nov. is morphologically similar to *O. lorentzi* Bolívar, 1929 (Lorenzi species group), *O. flyriveriensis* sp. nov., *O. kaitani* sp. nov., *O. katharinae* sp. nov. and *O. karimuiensis* sp. nov. (Katharinae species group), but differs from other species by its smaller size: pronotum length male <7 mm (in other species >8 mm) and female <8 mm (in other species listed >9 mm).

Distribution: Sibil Valley.

***Ophiotettix rebrinae* sp. nov.** (Plate 107 fig. 6, plate 111 fig. 5, plate 115 fig. 5, plate 119 fig. 5, plate 122 fig. 1)

Holotype ♂ BPBM: INDONESIAN NEW GUINEA, Bodem, 11 km SE of Oerberfaren [1°58'S 138°44'E], 100 m, 7.–17.VII.1959, leg. T. C. Maa.

Derivatio nominis: Patronymic. The specific epithet is male surname in the genitive case of the first Latin declension (-a declension, usually for feminine nouns, but since the surname of dedication ends in –a, we found it appositely to use the first declension instead of the second) - 'Rebrina, -ae, m.' The species is dedicated to Fran Rebrina, a young Croatian entomologist specialized in Orthoptera (especially Ensifera), and a good friend of Skejo. We are very happy to dedicate this species to our enthusiastic colleague.

Description: Apical segments of the antennae pale (third segment from the tip more than half of its length). No antennal segment with tip at the inner margin. Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) narrow and parallel. Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together shorter than third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Inner edge of the dorsal margin of fifth antennal segment from the tip (segment 11 in ♀♀, 10 in ♂♂) directed backwards. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) narrower than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex run parallel. Tip of the fastigium brightened. Median carina of the vertex, in frontal view, little bit deeper than lateral carinae. Pronotum with yellow stripes. Hind femora and visible part of the abdomen partially yellow. Measurements holotype ♂: pronotum length 8,19 mm, pronotum lobe width 3.45 mm, pronotum height 2.0 mm, hind femur length 8.06 mm, hind femur width 1.45 mm, vertex width 0.37 mm, eye width 0.64 mm, antenna length 7.15 mm, head length 4.25 mm, head index 1.95.

Differential diagnosis: As a species with pale apical antennal segments and no antennal segments with protruding tip at the inner margin *O. rebrinae* sp. nov. (Pulcherrima species group) is near to *O. fritzpahli* sp. nov. (Westwoodi species group, however shares some characters with species of the Pulcherrima group) and *O. pulclherrima* sp. nov. (Pulcherrima species group). It differs from these species by fifth antennal segment, curved backwards at the dorsal inner margin.

Distribution: Bodem.

***Ophiotettix roesleri* sp. nov.** (Plate 107 figs 7-8, plate 111 figs 6-7, plate 115 figs 6-7, plate 119 figs 6-7, plate 122 fig. 2)

Holotype ♂ NCB–RMNH, INDONESIAN NEW GUINEA, Sigi Camp [3°33'S 139°02'E], 1500 m, 28.II.1939, Neth. Ind.–American New Guinea Exped., leg. L. J. Toxopeus.

Paratypes: 1♀, 1♂ (1/18–2/18) NCB–RMNH: INDONESIAN NEW GUINEA, Sigi Camp [3°33'S 139°02'E], 1500 m, 17.II.1939, Neth. Ind.–American New Guinea Exped., leg. L. J. Toxopeus; 1♀, 1♂ (3/18–4/18) NCB–RMNH: INDONESIAN NEW GUINEA, Sigi Camp [3°33'S 139°02'E], 1500 m, 19.II.1939, Neth. Ind.–American New Guinea Exped., leg. L. J. Toxopeus, deposited in BPBM (3/18) and ZFMK (4/18); 1♀






(5/18) NCB–RMNH: INDONESIAN NEW GUINEA, Sigi Camp [3°33'S 139°02'E], 1500 m, 22.II.1939, Neth. Ind.–American New Guinea Exped., leg. L. J. Toxopeus, deposited in BMNH (5/18); 2♀ (6/18–7/18) NCB–RMNH: INDONESIAN NEW GUINEA, Sigi Camp [3°33'S 139°02'E], 1500 m, 24.II.1939, Neth. Ind.–American New Guinea Exped., leg. L. J. Toxopeus, deposited in BMNH (6/18) [1♀ antennae lost]; 1♀ (8/18) NCB–RMNH: INDONESIAN NEW GUINEA, Sigi Camp [3°33'S 139°02'E], 1500 m, 25.II.1939, Neth. Ind.–American New Guinea Exped., leg. L. J. Toxopeus; 1♂ (9/18) NCB–RMNH: INDONESIAN NEW GUINEA, Sigi Camp [3°33'S 139°02'E], 1500 m, 26.II.1939, Neth. Ind.–American New Guinea Exped., leg. L. J. Toxopeus, deposited in BPBM; 1♀ (10/18) NCB–RMNH: INDONESIAN NEW GUINEA, Lower Mist Camp [3°30'S 139°05'E], 1600 m, 27.I.1939, Neth. Ind.–American New Guinea Exped., leg. L. J. Toxopeus; 3♀, 1♂ (11/18–14/18) NCB–RMNH: INDONESIAN NEW GUINEA, Lower Mist Camp [3°30'S 139°05'E], 1550 m, 31.I.1939, Neth. Ind.–American New Guinea Exped., leg. L. J. Toxopeus, deposited in ZFMK (12/18) [1♂ antennae lost]; 1♀ (15/18) NCB–RMNH: INDONESIAN NEW GUINEA, Lower Mist Camp [3°30'S 139°05'E], 1550 m, I.–II.1939, Neth. Ind.–American New Guinea Exped., leg. L. J. Toxopeus; 1♀, 1♂ (16/18–17/18) NCB–RMNH: INDONESIAN NEW GUINEA, Lower Mist Camp [3°30'S 139°05'E], 1550 m, 2.II.1939, Neth. Ind.–American New Guinea Exped., leg. L. J. Toxopeus [1♂ antennae lost]; 1♀ (18/18) ZSM: INDONESIAN NEW GUINEA, Jayawijaya–Prov., Wamena, Pronggoli [4°10'S 139°20'E], 2100–2400 m, 17.–19. IX.1991, leg. A. Riedel.

Additional material: 1♂ ZSM: INDONESIAN NEW GUINEA, Wamena, Pass–Valley [3°55'S 138°44'E], 1900 m, 15.–16.IX.1990, leg. A. Riedel.

Derivatio nominis: Patronymic. The specific epithet is the genitive case of the Latin second declension (-us declension) noun derived from the surname (Roeslerus, -i, m.) The species is dedicated to Stefan Rösler, former chairman of the Naturschutzbund Deutschland (NABU) in Baden-Württemberg.

Description: Together with *O. parvicollis* sp. nov. this is the smallest *Ophiotettix* species, with the shortest neck (head index <0.9). Apical and subapical segments of the antennae are black, other segments brownish. Third and fourth antennal segments from the tip (segments 11+12 in ♀♀, 12+13 in ♂♂) little bit lamellate and with little bit protruding inner margins of fourth antennal segment from the tip. Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) widened towards the tip. Inner edge of the dorsal margin of fifth antennal segment from the tip (segment 11 in ♀♀, 10 in ♂♂) directed backwards. Two apical segments (segment 14+15 in ♀♀, 13+14 in ♂♂) together as long as third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) narrower than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex run parallel. Tip of the fastigium dark. Median carina of the vertex, in frontal view, as high as lateral carinae. Pronotum with yellow or reddish stripes. Hind femora and visible part of the abdomen partially yellow or reddish. Measurements holotype ♂: pronotum length 5.72 mm, pronotum lobe width 2.75 mm, pronotum height 1.15 mm, hind femur length 6.11 mm, hind femur width 1.20 mm, vertex width 0.33 mm, eye width 0.57 mm, antenna length 6.37 mm, head length 3.65 mm, head index 0.96. Measurements paratypes 13♀: pronotum length (13♀): 6.75 - 7.80 mm, average 7.36 mm; pronotum lobe width (13♀): 3.25 - 3.50 mm, average 3.38 mm; pronotum height (13♀): 1.65 - 2.20 mm, average 1.95 mm; hind femur length (11♀): 6.5 - 7.67 mm, average 7.0 mm; hind femur width (11♀): 1.15 - 1.50 mm, average 1.35 mm; vertex width (13♀): 0.33 - 0.39 mm, average 0.36 mm; eye width (13♀): 0.55 - 0.64 mm, average 0.60 mm; antenna length (9♀): 5.85 - 7.15 mm, average 6.40 mm; head length (13♀): 3.6 - 4.10 mm, average 3.96 mm; head index (13♀): 1.15 - 1.45 mm, average 1.30 mm. Measurements paratypes 6♂: pronotum length (6♂): 5.72 - 6.50 mm, average 6.15 mm; pronotum lobe width (6♂): 2.75 - 3.0 mm, average 2.86 mm; pronotum height (6♂): 1.15 - 1.90 mm, average 1.56 mm; hind femur length (4♂): 6.11 - 6.50 mm, average 6.27 mm; hind femur width (4♂): 1.1 - 1.20 mm, average 1.24 mm; vertex width (6♂): 0.33 - 0.39 mm, average 0.36 mm; eye width (6♂): 0.57 - 0.62 mm, average 0.59 mm; antenna length (4♂): 5.85 - 6.50 mm, average 6.18 mm; head length (6♂): 3.4 - 3.80 mm, average 3.67 mm; head index (6♂): 0.96 - 1.34 mm, average 1.23 mm.

Differential diagnosis: *O. roesleri* sp. nov. is one of the species with no pale coloured apical antennal segments, subapical antennal segments with lamellate inner margins and the upper edge of fifth antennal segment from the tip is straight or curved backwards. Fourth antennal segment from the tip is widened in the whole length towards the tip. There are three other species with similar characters: *O. brevicollis* sp. nov. (Brevicollis species group), *O. stallei* sp. nov. (Stallei species group) and *O. subbrevicollis* sp. nov. (Brevicollis





species group). All species are small. *O. roesleri* sp. nov. can be separated from other species by smaller size (pronotum length male <6 mm (others >6 mm) and female <8 mm (others >8 mm)) and deep vertex.
Distribution: Mountains south of Mamberamo River.

***Ophiotettix rohwedderi* sp. nov.** (Plate 107 fig. 9, plate 111 figs 8-9, plate 115 figs 8-9, plate 119 figs 8-9, plate 122 fig. 3)
Holotype ♂ BPBM: PAPUA NEW GUINEA, [Western Highlands Prov.], Upper Jimmi River, Tsenga [= Jimi River, 5°23'S 144°27'E], 1200 m, 15.VII.1955, leg. J. L. Gressitt [antennae lost].
Paratypes: 2♀ (1/5-2/5) BPBM: PAPUA NEW GUINEA, [Western Highlands Prov.], Upper Jimmi River, Tsenga [= Jimi River, 5°23'S 144°27'E], 1200 m, 15.VII.1955, leg. J. L. Gressitt, deposited in NCB-RMNH (2/5); 1♀, 1♂ (3/3, 4/5) BPBM: PAPUA NEW GUINEA, [Western Highlands Prov.], Baiyer River [5°32'S 144°09'E], 17.X.1958, leg. J. L. Gressit, deposited in BMNH (3/5) and ZFMK (4/5) [♀, ♂ antennae lost]; 1♀ (5/5) BPBM: PAPUA NEW GUINEA, [Western Highlands Prov.], Baiyer River [5°32'S 144°09'E], 18.X.1958, leg. J. L. Gressitt, deposited in ZFMK.

Derivatio nominis: Patronymic. The specific epithet is the genitive case of the second (-us) Latin declension derived from a Latinized surname (Rohwedderus, -i, m.). The species is dedicated to Dirk Rohwedder, an entomologist - coleopterologist and hymenopterist and very helpful colleague from Zoological Research Museum Alexander Koenig (ZFMK) in Bonn.
Description: Antennal segments dark. Third to sixth antennal segments from the tip (segments 10+11+12+13 in ♀♀, 9+10+11+12 in ♂♂) little bit lamellate with somewhat protruding inner margins. Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) widened towards the tip. Inner edge of the dorsal margin of sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) runs backwards. Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together as long as third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segments 12 in ♀♀, 11 in ♂♂). Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) narrower than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex run parallel. Tip of the fastigium brightened. Median carina of the vertex, in frontal view, deeper than lateral carinae. Tip of the fastigium, in lateral view, little bit protruded in front of the eyes. Pronotum with yellow stripes. Hind femora and visible part of the abdomen partially yellow. Measurements holotype ♂: pronotum length 7.28 mm, pronotum lobe width 3.20 mm, pronotum height 1.85 mm, hind femur length 7.15 mm, hind femur width 1.50 mm, vertex width 0.33 mm, eye width 0.57 mm, antenna length no measurements, head length 4.20 mm, head index 1.57.
Measurements paratypes 4♀: pronotum length (4♀): 8.06 - 9.10 mm, average 8.52 mm; pronotum lobe width (4♀): 3.45 - 3.85 mm, average 3.61 mm; pronotum height (4♀): 1.75 - 2.35 mm, average 2.03 mm; hind femur length (4♀): 7.02 - 8.19 mm, average 7.74 mm; hind femur width (4♀): 1.6 - 1.75 mm, average 1.65 mm; vertex width (4♀): 0.31 - 0.33 mm, average 0.32 mm; eye width (4♀): 0.55 - 0.64 mm, average 0.61 mm; antenna length (3♀): 6.63 - 7.93 mm, average 7.49 mm; head length (4♀): 4.3 - 5.0 mm, average 4.58 mm; head index (4♀): 1.68 - 1.76 mm, average 1.72 mm
Differential diagnosis: *O. rohwedderi* sp. nov. is one of the species with no pale coloured apical antennal segments, subapical antennal segments with lamellate inner margins and a fifth antennal segment from the tip with protruded lateral edge into spine or acute angle. The sixth antennal segment from tip is not broadly lamellate. *O. rohwedderi* sp. nov. is near to *O. modesta* stat. rev., *O. imbiana* sp. nov., *O. schapinae* sp. nov. and *O. tenuis* sp. nov. (all species, including *O. rohwedderi* sp. nov. members of the Buergersi species group). It differs from these species by the fourth antennal segment from the tip morphology. This segment is widened to the tip (not parallel or smaller).
Distribution: Jimi and Baiyer River in Western Highlands Province.

***Ophiotettix sanguinea* sp. nov.** (Plate 107 fig. 10, plate 111 figs 10-11, plate 115 figs 10-11, plate 119 figs 10-11, plate 122 fig. 5)
Holotype ♀ BPBM: INDONESIAN NEW GUINEA, Waris, S. of Hollandia [3°11'S 140°53'E], 450 - 500 m, 16.–23.VIII.1959, leg. T. C. Maa.
Paratypes: 2♀ (1/4–2/4) BPBM: INDONESIAN NEW GUINEA, Waris, S. of Hollandia [3°11'S 140°53'E], 450– 500 m, 16.–23.VIII.1959, leg. T. C. Maa, deposited in ZFMK (1/4) and BMNH (2/4); 1♂ (3/4) BPBM: INDONESIAN NEW GUINEA, Waris, S. of Hollandia [3°11'S 140°53'E], 450– 500 m, 1.–2.VIII.1959, leg. T. C. Maa [antennae lost]; 1♀ (4/4) BPBM: INDONESIAN NEW GUINEA, Waris, S. of Hollandia [3°11'S 140°53'E], 450– 500 m, 24.–31.VIII.1959, leg. T. C. Maa, deposited in NCB–RMNH [antennae damaged].






Derivatio nominis: The specific epithet is a Latin first and second declension adjective in the feminine gender - 'sanguineus, -a. -um', meaning 'bloody', and referring to the reddish hind femora of the holotype.

Description: Antennal segments dark. Only the very apical segment (segment 15 in ♀♀, 14 in ♂♂) and nodes of the basal segments brownish. Fourth to sixth antennal segments from the tip (segments 11+12+13 in ♀♀, 10+11+12 in ♂♂) lamellate with protruded inner margins of fourth and fifth antennal segments from the tip (segments 11+12 in ♀♀, 10+11 in ♂♂). The dorsal 1/4 of fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) parallel towards the tip. Dorsal margin of sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) with distinct edge. Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together as long as third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segment 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) broader than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex run parallel. Tip of the fastigium brightened. Median carina of the vertex, in frontal view, deeper than lateral carinae. Pronotum with broad yellow lateral stripes. Hind femora reddish with dark knees. Visible part of the abdomen partially yellow. Measurements holotype ♀: pronotum length 9.10 mm, pronotum lobe width 3.80 mm, pronotum height 2.25 mm, hind femur length 7.80 mm, hind femur width 1.95 mm, vertex width 0.43 mm, eye width 0.62 mm, antenna length 7.80 mm, head length 4.65 mm, head index 1.48. Measurements paratypes 4♀: pronotum length (4♀): 8.84 - 9.36 mm, average 9.10 mm; pronotum lobe width (4♀): 3.75 - 3.85 mm, average 3.80 mm; pronotum height (4♀): 1.95 - 2.25 mm, average 2.16 mm; hind femur length (3♀): 7.8 - 8.71 mm, average 8.10 mm; hind femur width (3♀): 1.7 - 1.95 mm, average 1.80 mm; vertex width (4♀): 0.37 - 0.43 mm, average 0.40 mm; eye width (4♀): 0.63 - 0.72 mm, average 0.69 mm; antenna length (3♀): 7.8 - 8.97 mm, average 8.41 mm; head length (4♀): 4.65 - 4.80 mm, average 4.71 mm; head index (4♀): 1.48 - 1.71 mm, average 1.59 mm. Measurements paratype ♂ (3/4): pronotum length 7.28 mm, pronotum lobe width 1.80 mm, pronotum height 1.85 mm, hind femur length 6.50 mm, hind femur width 1.55 mm, vertex width 0.43 mm, eye width 0.66 mm, antenna length no measurements, head length 4.10 mm, head index 1.5.

Differential diagnosis: Together with *O. buergersi* Bolívar, 1929 (both belong to the Buergersi species group) this is the only species with dark apical antennal segments where sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) is broadly lamellate and with a protruding tip or edge at the inner margin. It can be separated from *O. buergersi* by sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂), which bears a not protruding edge. The hind femora of *O. sanguinea* sp. nov. are conspicuously reddish - we did not find such feature in any other species.

Distribution: Waris, south of Jayapura.

***Ophiotettix schapinae* sp. nov.** (Plate 107 fig. 11, plate 111 figs 12-13, plate 115 figs 12-13, plate 119 figs 12-13, plate 122 fig. 6)

Holotype ♀ BPBM: INDONESIAN NEW GUINEA, S[outh] Geelvink Bay, Nabire [3°23'S 135°28'E], 0–30 m, 2.–9.VII.1962, leg. J. L. Gressitt.

Paratypes: 2♀, 1♂ (1/3–3/3) BPBM: INDONESIAN NEW GUINEA, S[outh] Geelvink Bay, Nabire [3°23'S 135°28'E], 0–30 m, 2.–9.VII.1962, leg. J. L. Gressitt, deposited in MNSL (2/3) and ZFMK (3/3) [1♀, 1♂ antennae lost].

Derivatio nominis: Patronymic. The species is named after Ivan Šapina, currently undergraduate student at the Department of Biology (Faculty of Science, University of Zagreb), who helped us with cladistic analysis of Tetrigidae, and who is learning about pygmies and how awesome they are - for all the help and to encourage further interest we are happy to dedicate one species to him - 'Šapina's giraffehopper'. The specific epithet is the genitive case of Ivan's surname, Germanized (making grapheme š into sch) and Latinized (being Genitive case male gender noun of the first Latin declension, usually used for female nouns) Ivan's surname. In Croatian, Serbian, Bosnian, and Montenegrin dialects and languages word šapina is one augmentative of šapa, meaning a large paw.

Description: Antennal segments dark. Third to sixth antennal segments from the tip (segment 10+11+12+13 in ♀♀, 9+10+11+12 in ♂♂) lamellate with little bit protruding inner margins (third to fifth antennal segments from the tip). Inner edge of the dorsal margin of sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) directed backwards. Two apical segments (segment 14+15 in ♀♀, 13+14 in ♂♂) together as long as third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segment 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth






segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) as broad as third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segment 13+14+15 in ♀♀, 12+13+14 in ♂♂) with distinct silver bristles. Lateral carinae of the vertex run parallel. Tip of the fastigium dark. Median carina of the vertex, in frontal view, as high as lateral carinae. Pronotum with broad reddish lateral stripes. Hind femora at the dorsal part reddish (female) or whitish (male). Visible part of the abdomen dark. Measurements holotype ♀: pronotum length 9.75 mm, pronotum lobe width 3.60 mm, pronotum height 2.30 mm, hind femur length 8.84 mm, hind femur width 1.80 mm, vertex width 0.41 mm, eye width 0.66 mm, antenna length 8.58 mm, head length 4.90 mm, head index 1.68. Measurements paratype ♀: pronotum length no measurements, pronotum lobe width 4.0 mm, pronotum height 2.25 mm, hind femur length 8.84 mm, hind femur width 1.85 mm, vertex width 0.39 mm, eye width 0.74 mm, antenna length –.– mm, head length 4.90 mm, head index 1.44. Measurements paratype ♂: pronotum length 8.19 mm, pronotum lobe width 3.40 mm, pronotum height 1.80 mm, hind femur length 7.28 mm, hind femur width 1.50 mm, vertex width 0.41 mm, eye width 0.62 mm, antenna length no measurements, head length 4.55 mm, head index 1.55.

Differential diagnosis: *O. schapinae* sp. nov. is one of the species without pale coloured apical antennal segments, subapical antennal segments with lamellate inner margins and fifth antennal segment from the tip with lateral edge protruded into spine or acute angle. Sixth antennal segment from tip is not broadly lamellate. *O. schapinae* sp. nov. is close to *O. modesta* stat. rev., *O. imbiana* sp. nov., *O. rohwedderi* sp. nov. and *O. tenuis* sp. nov. (all members of the Buergersi species group, only *O. buergersi* Bolívar, 1929 not listed). It can be distinguished from the listed species by the dark tip of the fastigium.

Distribution: Nabire.

***Ophiotettix stallei* sp. nov.** (Plate 107 fig. 12, plate 111 fig. 14, plate 115 fig. 14, plate 119 fig. 14, plate 122 fig. 7)

Holotype ♂, IRSNB: PAPUA NEW GUINEA, [Morobe Prov.], Anguaia 1800 m (St. 050) [= Anggaie?, 7°14'S 146°24'E], 21.V.1988, leg. J. van Stalle.

Derivatio nominis: Patronymic. The species is named in honour of its collector Jan van Stalle, a Belgian entomologist, specialized in planthoppers - Homoptera. The specific epithet is the genitive case of the Latinized version of Jan's surname - 'Stalleus, -i, m.'

Description: Apical segments of the antennae black, other segments brownish. Fourth and fifth antennal segments from the tip (segments 11+12 in ♀♀, 10+11 in ♂♂) little bit lamellate, with only somewhat protruding inner margin of fourth antennal segment from the tip. Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) widened towards the tip. Inner edge of the dorsal margin of fifth antennal segment from the tip (segment 11 in ♀♀, 10 in ♂♂) distinct. Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together longer than third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Inner edge of the dorsal margin of fifth and sixth antennal segments from the tip (segment 10+11 in ♀♀, 9+10 in ♂♂) directed backwards. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) broader than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex run parallel. Tip of the fastigium dark. Median carina of the vertex, in frontal view, little bit deeper than lateral carinae. Tip of the fastigium, in lateral view, little bit protruding in front of the eyes. Pronotum with yellow stripes. Hind femora and visible part of the abdomen partially yellow. Measurements holotype ♂: pronotum length 6.50 mm, pronotum lobe width 3.30 mm, pronotum height 1.75 mm, hind femur length 6.37 mm, hind femur width 1.40 mm, vertex width 0.29 mm, eye width 0.59 mm, antenna length 5.33 mm, head length 3.70 mm, head index 1.2.

Differential diagnosis: *O. stallei* sp. nov. is one of the species without pale coloured apical antennal segments, subapical antennal segments with lamellate inner margins and the upper edge of fifth antennal segment from the tip straight or curved backwards. Fourth antennal segment from the tip is widened in the whole length towards the tip. It is the only species within the Stallei species group, most similar to Brevicollis species group. There are three other species with similar characters: *O. brevicollis* sp. nov., *O. roesleri* sp. nov. and *O. subbrevicollis* sp. nov. (Brevicollis species group). All species are very small. *O. stallei* sp. nov. differs from *O. brevicollis* sp. nov. and *O. subbrevicollis* sp. nov. by dark tip of the fastigium. From *O. roesleri* sp. nov. it differs in sixth antennal segment from the tip which is widened, has recognizable edges and is









smaller than third antennal segment from the tip.
Distribution: Anggaie (Kuper Range).

***Ophiotettix storozhenkoi* sp. nov.** (Plate 107 figs 13-14, plate 111 figs 15-16, plate 115 figs 15-16, plate 119 figs 15-16, plate 122 fig. 8, plate 124 figs 1-2)

Holotype ♂ BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, sedge (large), 700–900 m, 3.VI.1959, leg. J. L. Gressitt.
Paratypes: 4♀, 2♂ (1/28–6/28) BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700–900 m, 4.VI.1959, leg. J. L. Gressitt, deposited in NME (1/28), ZFMK (2/28, 5/28) and NCB–RMNH (3/28); 2♀, 1♂ (7/28–9/28) BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700–900 m, 5.VI.1959, leg. J. L. Gressitt [2♂ antennae lost]; 4♂ (10/28–13/28) BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700–900 m, 6.VI.1959, leg. J. L. Gressitt, deposited in MNSL (10/28) [1♂ antennae lost]; 2♀, 1♂ (14/28–16/28) BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700–900 m, 7.VI.1959, leg. T. C. Maa, deposited in NCB–RMNH (16/28), [1♀ antennae lost]; 1♂ (17/28) BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700–900 m, 7.VI.1959, leg. J. L. Gressitt, deposited in ANSP; 1♂ (18/28) BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700–900 m, 9.VI.1959, leg. J. L. Gressitt, deposited in BMNH; 1♀ (19/28), INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700–900 m, 9.VI.1959, leg. T. C. Maa [antennae lost]; 1♀ (20/28), INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700–900 m, 10.VI.1959, leg. T. C. Maa, deposited in BMNH; 1♂ (21/28) ANSP: INDONESIAN NEW GUINEA, [Vogelkop], Fak Fak, [2°55'S 132°17'E] [antennae lost]; 1♀, 1♂ (22/28–23/28) BPBM: INDONESIAN NEW GUINEA, Vogelkop, Fak Fak, S. coast of Bomberai [2°55'S 132°17'E], 100–700 m, 4.VI.1959, leg. T. C. Maa [1♀ antennae lost]; 2♂, 1♀ nymph (24/28–26/28) BPBM: INDONESIAN NEW GUINEA, Vogelkop, Fak Fak, S. coast of Bomberai [2°55'S 132°17'E], 100–700 m, 5.VI.1959, leg. T. C. Maa [1♂ antennae lost]; 1♀ (27/28) BPBM: INDONESIAN NEW GUINEA, Vogelkop, Fak Fak, S. coast of Bomberai [2°55'S 132°17'E], 100–700 m, 8.VI.1959, leg. T. C. Maa [antennae lost]; 1♀ (28/28), NME: Fak–Fak peninsula, Fak–Fak, 12–13 km N, 2°50'06''S 132°18'22''E, 880–920 m, primeval mossy mountain rainforest on limestone, 24.IX.2010, leg. D. Telnov [antennae damaged].
Additional material: 1♂ nymph BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, sedge (large), 700–900 m, 3.VI.1959, leg. J. L. Gressitt; 1♀ nymph BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700–900 m, 4.VI.1959, leg. J. L. Gressitt; 1♂ nymph BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, sweeping, 700–900 m, 6.VI.1959, leg. T. C. Maa; 1♂ nymph BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700–900 m, 6.VI.1959, leg. J. L. Gressitt; 1♂ nymph BPBM: INDONESIAN NEW GUINEA, Vogelkop [Onin Peninsula], Bomberi, 700–900 m, 7.VI.1959, leg. T. C. Maa; 1♀ nymph BPBM: INDONESIAN NEW GUINEA, Vogelkop, Fak Fak, S. coast of Bomberai [2°55'S 132°17'E], 100–700 m, 4.VI.1959, leg. T. C. Maa; 2♀ nymphs, 1♂ nymph BPBM: INDONESIAN NEW GUINEA, Vogelkop, Fak Fak, S. coast of Bomberai [2°55'S 132°17'E], 100–700 m, 5.VI.1959, leg. T. C. Maa.

Derivatio nominis: Patronymic. The species is named in honour of Russian entomologist, specialized in classification, distribution, and ecology of Polyneoptera, who significantly contributed to Tetrigidae studies of Asia, Wallacea, and New Guinea - Sergey Yu. Storozhenko, our dear colleague and also member of SIGTET - Special Interest Group Tetrigidae. The specific epithet is the genitive case of Sergey's Latinized surname 'Storozhenkous, -i, m'.
Description: Apical segments of the antennae brownish, subapical segments of the antennae black, other segments more brownish. Third to fifth antennal segments from the tip (segments 11+12+13 in ♀♀, 10+11+12 in ♂♂) like a "cup", with a long tip at the inner margin. Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together shorter than third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) narrower than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex run parallel. Tip of the fastigium dark. Median carina of the vertex deeper than lateral carinae of the vertex. Pronotum with yellow stripes. Visible part of the abdomen predominantly black. Hind femora dark. Measurements holotype ♂: pronotum length 7.80 mm, pronotum lobe width 3.10 mm, pronotum height 1.70 mm, hind femur length 7.93 mm, hind femur width 1.45 mm, vertex width 0.43 mm, eye width 0.64 mm, antenna length 7.54 mm, head length 4.75 mm, head index 1.59. Measurements paratypes 12♀: pronotum length (12♀): 8.97 - 10.14 mm, average 9.64 mm; pronotum lobe width (12♀): 3.6 - 3.85 mm, average 3.73 mm; pronotum height (12♀): 1.65 - 2.15 mm, average 1.92 mm; hind femur length (12♀): 8.06 - 9.23 mm, average 8.82 mm; hind femur width (12♀): 1.6 - 1.80 mm, average 1.71 mm; vertex width (12♀): 0.45 - 0.57 mm, average 0.49 mm; eye width (12♀): 0.64 - 0.72 mm, average 0.67 mm; antenna length (7♀): 7.8 - 10.01 mm, average 8.88






mm; head length (12♀): 4.88 - 5.28 mm, average 5.11 mm; head index (12♀): 1.57 - 1.82 mm, average 1.68 mm. Measurements paratypes 13♂: pronotum length (12♂): 7.54 - 8.71 mm, average 8.05 mm; pronotum lobe width (13♂): 3.05 - 3.45 mm, average 3.17 mm; pronotum height (13♂): 1.5 - 1.85 mm, average 1.67 mm; hind femur length (13♂): 7.28 - 8.32 mm, average 7.83 mm; hind femur width (13♂): 1.35 - 1.55 mm, average 1.48 mm; vertex width (13♂): 0.41 - 0.55 mm, average 0.48 mm; eye width (13♂): 0.59 - 0.68 mm, average 0.64 mm; antenna length (9♂): 7.54 - 9.23 mm, average 8.42 mm; head length (13♂): 4.4 - 4.95 mm, average 4.66 mm; head index (13♂): 1.57 - 1.74 mm, average 1.70 mm.

Differential diagnosis: *O. storozhenkoi* sp. nov. is one of the species without pale coloured apical antennal segments, subapical antennal segments with lamellate inner margins and third antennal segment from the tip with distinctly protruded long tip at the inner margin. *O. storozhenkoi* sp. nov. is morphologically similar to *O. cygnicollis* Walker, 1871, *O. amberiana* sp. nov., *O. pushkari* sp. nov. (members of Cygnicollis species group, together with *O. storozhenkoi* sp. nov.) and *O. toxopei* sp. nov. (Toxopei species group). From aforementioned species this is the only species with deep vertex.

Distribution: Fak Fak Mountains, Onin Peninsula in the west part of the Bomberai Peninsula.

***Ophiotettix subbrevicollis* sp. nov.** (Plate 107 figs 115-16, plate 111 figs 17-18, plate 115 figs 17-18, plate 119, figs 17-18, plate 122 fig. 9)

Holotype ♂ AMS: PAPUA NEW GUINEA, [Morobe Prov.], Melambi R., Lae, Mirilunga Village, 4500 ft, 29.XII.1956, leg. J. H. Ardley.

Paratypes: ♀ (1/11) BPBM: PAPUA NEW GUINEA, [Morobe Prov.], Salawaket Range, Baindep, 1260 m, 16.IX.1956, leg. E. J. Ford jr.; 2♀ (2/11–3/11) BPBM: PAPUA NEW GUINEA, [Morobe Prov.], Salawaket Range, Mosom, 750 m, 20.IX.1956, leg. E. J. Ford jr.; 1♀ (4/11) BPBM: PAPUA NEW GUINEA, [Morobe Prov.], Salawaket Range, Tuwep, 1350 m, 8.IX.1956, leg. E. J. Ford jr.; 1♀ (5/11) BPBM: PAPUA NEW GUINEA, [Morobe Prov.], Salawaket Range, Tuwep, 1350 m, 9.IX.1956, leg. E. J. Ford jr.; 3♀ (6/11–8/11) AMS: PAPUA NEW GUINEA, [Morobe Prov.], Melambi R., Lae, Mirilunga Village, 4500 ft, 29.XII.1956, leg. J. H. Ardley; 1♂ (9/11) AMS: PAPUA NEW GUINEA, [Morobe Prov.], Melambi R., Lae, Mirilunga Village, 4500 ft, 16.VI.1957, leg. J. H. Ardley [antennae lost]; 1♀, 1♂ (10/11–11/11) AMS: PAPUA NEW GUINEA, [Madang Prov..], Finisterre Range, nr. Butemu [5°56'S 146°04'E], 4000 ft, 8.IX.1956, leg. R. Pullen.

Additional material: 1♀ BPBM: PAPUA NEW GUINEA, [Morobe Prov.], Huon Pen., Laleng, 23.IV.1963, leg. J. Sedlacek [antennae lost]; 1♀ nymph BPBM: PAPUA NEW GUINEA, [Morobe Prov.], Salawaket Range, Gewak [6°26'S 146°53'E], 1530m, 7.IX.1956, leg. E. J. Ford jr.

Derivatio nominis: The species name is combination of three words - 'sub', 'brevis', and 'collis'. 'Sub' is preposition with ablative case meaning 'under', 'brevis' is third declension adjective meaning 'short' and 'collis' is ablative of neuter gender noun, meaning 'neck'. Literal translation of the binomen is 'Snakehopper (Giraffehopper) under the short necks'. The species is, as it is already clear, named after its short neck.

Description: Apical and subapical segments of the antennae black, other segments brownish. Fourth and fifth antennal segments from the tip (segments 11+12 in ♀♀, 10+11 in ♂♂) little bit lamellate, with only somewhat protruding inner margins. Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) widened towards the tip. Inner edge of the dorsal margin of fifth and sixth antennal segments from the tip (segments 10+11 in ♀♀, 9+10 in ♂♂) directed backwards. Two apical segments (segment 14+15 in ♀♀, 13+14 in ♂♂) together as long as third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segment 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) as broad as third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex run parallel. Tip of the fastigium brightened. Median carina of the vertex, in frontal view, somewhat deeper than lateral carinae of the vertex. Pronotum with yellow stripes. Hind femora and visible part of the abdomen partially yellow. Measurements holotype ♂: pronotum length 7.02 mm, pronotum lobe width 3.05 mm, pronotum height 1.70 mm, hind femur length 6.89 mm, hind femur width 1.45 mm, vertex width 0.37 mm, eye width 0.61 mm, antenna length 6.63 mm, head length 4.25 mm, head index 1.22. Measurements paratypes 10♀: pronotum length (10♀): 7.8 - 9.36 mm, average 8.35 mm; pronotum lobe width (10♀): 3.4 - 3.85 mm, average 3.55 mm; pronotum height (10♀): 1.8 - 2.35 mm, average 2.12 mm; hind femur length (8♀): 7.65 - 8.45 mm, average 7.91 mm; hind femur width (8♀): 1.55 - 1.70 mm, average 1.62 mm; vertex width (10♀): 0.39 - 0.49 mm, average 0.43 mm; eye width (10♀): 0.59 - 0.64 mm, average 0.61 mm; antenna length (9♀): 6.76 - 7.93 mm, average 7.28 mm; head length (10♀): 4.45 - 4.75 mm, average 4.63 mm; head index (10♀): 1.48 - 1.67 mm, average 1.61 mm.






Measurements paratypes 3♂: pronotum length (3♂): 7.02 - 7.67 mm, average 7.28 mm; pronotum lobe width (3♂): 3.0 - 3.20 mm, average 3.08 mm; pronotum height (3♂): 1.7 –1.75 mm, average 1.73 mm; hind femur length (3♂): 6.89 - 7.41 mm, average 7.19 mm; hind femur width (3♂): 1.4 - 1.50 mm, average 1.45 mm; vertex width (3♂): 0.37 - 0.43 mm, average 0.39 mm; eye width (3♂): 0.57 - 0.61 mm, average 0.59 mm. Antenna length (1): 6.63 mm, average 6.63 mm; head length (3♂): 4.15 - 4.40 mm, average 4.27 mm; head index (3♂): 1.22 - 1.55 mm, average 1.41 mm.

Differential diagnosis: *O. subbrevicollis* sp. nov. is one of the species without pale coloured apical antennal segments, subapical antennal segments with lamellate inner margins and the upper edge of fifth antennal segment from the tip being straight or curved backwards. Fourth antennal segment from the tip is widened in the whole length towards the tip. There are three other species with similar characters: *O. brevicollis* sp. nov., *O. roesleri* sp. nov. (Brevicollis species group) and *O. stallei* sp. nov. (Stallei species group, close to Brevicollis species group). All species are very small. *O. subbrevicollis* sp. nov. can be distinguished from *O. roesleri* sp. nov. and *O. stallei* sp. nov. by brightened tip of the fastigium. From *O. brevicollis* sp. nov. it can easily be separated by sixth antennal segment from the tip which is widened and has recognizable edge.

Distribution: Finisterre and Saruwaked Range.

***Ophiotettix telefominensis* sp. nov.** (Plate 107 fig. 17, plate 111 fig. 19, plate 115 fig. 19, plate 119 fig. 19, plate 122 Fig. 10)

Holotype ♂ BPBM: PAPUA NEW GUINEA, [Western Prov.], Telefomin (Light Trap) [5°08'S 141°35'E], 1450 m, 4.–7.IX.1963, leg. R. Straatman.

Additional material: ♀ or ♂ nymph BPBM: PAPUA NEW GUINEA, [Western Prov.], Telefomin [5°08'S 141°35'E], 1450 m, 7.VIII.1963, leg. R. Straatman (BPBM).

Derivatio nominis: Toponymic. The species is named after its type locality. The specific epithet is third Latin declension adjective in feminine gender derived from name of the type locality - 'telefominenis, –e', meaning 'from Telefomin', but can also be regarded as noun describing inhabitant (Telefominensis, –is, f.) - meaning 'Giraffehopper - the Telefominian'.

Description: One of the smaller species. Apical segments of the antennae black, other segments brownish. No antennal segments with a clear tip at the inner margin, but fourth and fifth antennal segments from the tip (segments 11+12 in ♀♀, 12+13 in ♂♂) little bit lamellate, with a distinct minute tip. Two apical segments (segment 14+15 in ♀♀, 13+14 in ♂♂) together shorter than third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segment 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) widened towards the tip. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) narrower than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex run divergent to the tip. Tip of the fastigium dark. Median carina of the vertex, in frontal view, somewhat deeper than lateral carinae of the vertex. Tip of the fastigium, in lateral view, significantly protruded in front of the eyes. Pronotum without or with yellow stripes. Visible part of the abdomen and hind femora partially yellow. Measurements holotype ♂: pronotum length 8.06 mm, pronotum lobe width 3.45 mm, pronotum height 1.80 mm, hind femur length 7.15 mm, hind femur width 1.65 mm, vertex width 0.33 mm, eye width 0.62 mm, antenna length 7.15 mm, head length 4.15 mm, head index 1.05.

Differential diagnosis: *O. telefominensis* sp. nov. could be regarded as a neotenic form, a species with distinctly protruding fastigium (pygmy unicorn giraffehopper). Little bit protruded fastigium in front of the eyes (in lateral view) is found also in *O. westwoodi* stat. rev. (Westwoodi species group), *O. parvicollis* sp. nov. (Brevicollis species group), *O. projecta* sp. nov. (Limosina species group), *O. rohwedderi* sp. nov. (Buergersi species group), *O. stallei* sp. nov. (Stallei species group) and *O. subbrevicollis* sp. nov. (Brevicollis species group). Obviously, this produced vertex is a nymphal character and can be regarded as neotenic. Antennal morphology of species with prolonged vertex is not similar, nor head morphology and colouration. It seems this developed separately in a lot of species groups within *Ophiotettix*. *O. telefominensis* sp. nov. is the only species of *Ophiotettix* with divergent lateral carinae of the vertex.

Distribution: Mount Telefomin.

***Ophiotettix tenuis* sp. nov.** (Plate 108 figs 1-2, plate 112 figs 1-2, plate 116 figs 1-2, plate 120 figs 1-2, plate 122 fig. 11)

Holotype ♂ NCB–RMNH: INDONESIAN NEW GUINEA, Araucaria Camp [3°30'S 139°11'E], 800 m, 24.III.1939, leg. L. J. Toxopeus.

Paratypes: 1♀ (1/3) NCB–RMNH: INDONESIAN NEW









GUINEA, Rattan Camp [3°30'S 139°09'E], 1000 m, 7.II.1939, leg. L. J. Toxopeus; 1♀ (2/3) NCB–RMNH: INDONESIAN NEW GUINEA, Rattan Camp [3°30'S 139°09'E], 1150 m, 13.II.1939, leg. L. J. Toxopeus, deposited in BPBM [antennae lost]; 1♂ (3/3) NCB–RMNH: INDONESIAN NEW GUINEA, Araucaria Camp [3°30'S 139°11'E], 800 m, 24.III.1939, leg. L. J. Toxopeus, deposited in ZFMK.

Derivatio nominis: The specific epithet is third declension Latin adjective 'tenuis, -e' meaning thin, fine, slim, or slender. We picked this epithet due to moderately widened antennal segments, which are, within the Buergersi species group - slender and thin.

Description: Apical segments of the antennae black, other segments brownish. Third to fifth antennal segments from the tip (segments 11+12+13 in ♀♀, 10+11+12 in ♂♂) lamellate with somewhat protruding inner margins. Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together shorter than third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segment 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). Fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) widened towards the tip. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) as broad as third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex run parallel. Tip of the fastigium brightened. Median carina of the vertex, in frontal view, as high as lateral carinae. Pronotum with yellow stripes. Visible part of the abdomen and hind femora partially yellow. Measurements holotype ♂: pronotum length 7.93 mm, pronotum lobe width 3.45 mm, pronotum height 1.85 mm, hind femur length 9.10 mm, hind femur width 1.35 mm, vertex width 0.43 mm, eye width 0.66 mm, antenna length 10.27 mm, head length 4.96 mm, head index 1.96. Measurements paratype ♀♀ (1/3+2/3): pronotum length 9.75+9.23 mm, pronotum lobe width 3.8+3.65 mm, pronotum height 2.1+1.95 mm, hind femur length - +9.49 mm, hind femur width - +1.55 mm, vertex width 0.51+0.49 mm, eye width 0.68+0.70 mm, antenna length 10.92+ no measurement, head length 5.28+5.20 mm, head index 2.0+1.96. Measurements paratype ♂ (3/3): pronotum length 9.36 mm, pronotum lobe width 3.90 mm, pronotum height 1.95 mm, hind femur length 9.75 mm, hind femur width 1.50 mm, vertex width 0.51 mm, eye width 0.70 mm, antenna length 10.14 mm, head length 5.44 mm, head index 2.0.

Differential diagnosis: *O. tenuis* sp. nov. is one of the species without pale coloured apical antennal segments, subapical antennal segments with lamellate inner margins and fifth antennal segment from the tip with lateral edge protruded into spine or acute angle. Sixth antennal segment from tip is not broadly lamellate. *O. tenuis* sp. nov. is similar in morphology to *O. modesta* stat. rev., *O. imbiana* sp. nov., *O. rohwedderi* sp. nov. and *O. schapinae* sp. nov. (all members of the Buergersi species group, only *O. buergersi* Bolívar, 1929 here not listed). It differs from *O. rohwedderi* sp. nov. and *O. schapinae* sp. nov. in two apical antennal segments which are together shorter than third antennal segment from the tip (not as long as). It can be separated from *O. modesta* stat. rev. and *O. imbiana* sp. nov. by the flat, not deep vertex.

Distribution: Upper Mamberamo River basin.

***Ophiotettix toxopei* sp. nov.** (Plate 108 figs 3-4, plate 112 figs 3-4, plate 116 figs 3-4, plate 120 figs 3-4, plate 122 fig. 12)

Holotype ♂ NCB–RMNH: INDONESIAN NEW GUINEA, Araucaria Camp [3°30'S 139°11'E], 800m, 8.III.1939, leg. L. J. Toxopeus

Paratypes: 1♀, 1♂ (1/11–2/11) NCB–RMNH: INDONESIAN NEW GUINEA, Rattan Camp [3°30'S 139°09'E], 1000 m, 7.II.1939, leg. L. J. Toxopeus, deposited in BPBM (1/11), [antennae lost]; 1♀ (3/11) NCB–RMNH: INDONESIAN NEW GUINEA, Rattan Camp [3°30'S 139°09'E], 1100 m, 2.III.1939, leg. L. J. Toxopeus; 1♂ (4/11) NCB–RMNH: INDONESIAN NEW GUINEA, Araucaria Camp [3°30'S 139°11'E], 800 m, 14.III.1939, leg. L. J. Toxopeus, deposited in ZFMK [antennae lost]; 1♀, 1♂ (5/11–6/11) NCB–RMNH: INDONESIAN NEW GUINEA, Araucaria Camp [3°30'S 139°11'E], 800 m, 18.III.1939, leg. L. J. Toxopeus [1♀, 1♂ antennae lost]; 1♀ (7/11) NCB–RMNH: INDONESIAN NEW GUINEA, Araucaria Camp [3°30'S 139°11'E], 800 m, 22.III.1939, leg. L. J. Toxopeus, deposited in BMNH [antennae lost]; 4♀ (8/11–11/11) NCB–RMNH: INDONESIAN NEW GUINEA, Araucaria Camp [3°30'S 139°11'E], 800 m, 2.IV.1939, leg. L. J. Toxopeus, deposited in ZFMK (11/11), [8/11–10/11 antennae lost].

Derivatio nominis: Patronymic. The species is named after its collector and Dutch India (Java born) entomologist, primarily lepidopterist and zoology professor (University of Batavia), Lambertus Johannes Toxopeus (1894-1951). He took part in the 1938-1939 Richard Archbold expedition in New Guinea, where he collected vast amount of, among others - *Ophiotettix* specimens. We are glad to dedicate this species to him. The specific epithet in Genitive case of Lamertus' surname (second, -us Latin declension) - Toxopei. Haec species est






Lamberti Joahannis Toxopei.
Description: Apical segments of the antennae black, other segments brownish. Third and fourth antennal segments from the tip (segments 11+12 in ♀♀, 10+11 in ♂♂) broadly lamellate with a short tip at the inner margin (this is characteristic only for this species - alone in the Toxopei species group). Two apical segments (segments 14+15 in ♀♀, 13+14 in ♂♂) together shorter than third apical segment (segment 13 in ♀♀, 12 in ♂♂). Three apical segments (segments 13+14+15 in ♀♀, 12+13+14 in ♂♂) together longer than fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂). The dorsal 1/4 of fourth antennal segment from the tip (segment 12 in ♀♀, 11 in ♂♂) convergent towards the tip. Inner dorsal margin of fifth antennal segment from the tip (segment 11 in ♀♀, 10 in ♂♂) curved backwards. Sixth antennal segment from the tip (segment 10 in ♀♀, 9 in ♂♂) narrower than third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂). Lateral carinae of the vertex run parallel. Tip of the fastigium brightened. Median carina of the vertex deeper than lateral carinae. Pronotum with yellow stripes. Visible part of the abdomen and hind femora partially yellow. Measurements holotype ♂: pronotum length 7.67 mm, pronotum lobe width 3.35 mm, pronotum height 1.65 mm, hind femur length 9.10 mm, hind femur width 1.50 mm, vertex width 0.43 mm, eye width 0.70 mm, antenna length 10.66 mm, head length 4.72 mm, head index 1.71. Measurements paratypes 8♀: pronotum length (8♀): 9.36 - 11.05 mm, average 9.95 mm; pronotum lobe width (8♀): 3.7 - 4.25 mm, average 3.91 mm; pronotum height (8♀): 2.05 - 2.30 mm, average 2.21 mm; hind femur length (7♀): 9.75 - 10.66 mm, average 10.03 mm; hind femur width (7♀): 1.55 - 1.65 mm, average 1.59 mm; vertex width (8♀): 0.49 - 0.55 mm, average 0.53 mm; eye width (8♀): 0.62 - 0.74 mm, average 0.69 mm; antenna length (2♀): 10.4 - 10.66 mm, average 10.53 mm; head length (8♀): 5.2 - 5.76 mm, average 5.39 mm; head index (8♀): 1.52 - 1.96 mm, average 1.83 mm. Measurements paratypes 4♂: pronotum length (4♂): 6.63 - 7.93 mm, average 7.44 mm; pronotum lobe width (4♂): 3.15 - 3.50 mm, average 3.34 mm; pronotum height (4♂): 1.65 - 1.80 mm, average 1.71 mm; hind femur length (4♂): 8.97 - 9.49 mm, average 9.23 mm; hind femur width (4♂): 1.4 - 1.50 mm, average 1.43 mm; vertex width (4♂): 0.43 - 0.51 mm, average 0.48 mm; eye width (4♂): 0.64 - 0.70 mm, average 0.68 mm; antenna length (1♂): 10.66 mm, average 10.66 mm; head length (4♂): 4.72 - 5.10 mm, average 4.89 mm; head index (4♂): 1.71 - 1.78 mm, average 1.74 mm.
Differential diagnosis: *O. toxopei* sp. nov. is unique in having widened third antennal segment from the tip (segment 13 in ♀♀, 12 in ♂♂) that is as broad as the widened fourth segment from the tip (segment 12 in ♀♀, 11 in ♂♂).
Distribution: Upper Mamberamo River basin.

Annotated list of unidentifiable material

1♀ BPBM: INDONESIAN NEW GUINEA, S[outh] Geelvink Bay, Nabire [3°23'S 135°28'E], 0-30 m, 2.-9.VII.1962, leg. J. L. Gressitt [antennae lost].
Only known species from this region is *O. schapinae*. This specimen cannot be assigned to this species, or to any of the species distributed nearby, namely *O. luce, O. bomberaiensis, O. scolopax, O. filiforma*. More specimens and especially specimens with antennae are essential for understanding the identity of this specimen.

2♀ BPBM: PAPUA NEW GUINEA, [Morobe Prov.], Muming [= Mumeng, 6°59'S 146°35'E], 600 m, 9.-10.III.1962, leg. J. Sedlacek [antennae lost].
O. brevicollis is the only species known in this region according to the examined collection. These females are not conspecific with this species or with other species nearest to this place (*O. parvicollis, O. stallei, O. kaitani*). More specimens, with preserved antennae are needed to identify these specimens accurately.

1♂ BPBM: PAPUA NEW GUINEA, [Morobe Prov.], Waru [6°59'S 146°35'E], 180 m, 5.VII.1963, leg. R. Straatman [antennae lost].
Specimen seems to be conspecific with *O. westwoodi,* despite of *O. modesta* being distributed in this area, as well - but final confirmation is not possible because the antennae are lost.

1♂ NCB-RMNH: INDONESIAN NEW GUINEA, Star Range, tussen Sibil en Ariemkop [= Arimkop, 4°46'S 140°38'E], 1240 m, 25.V.1959 [antennae lost].
Not conspecific with *O. quateorum* and may be a new species.

1♀ NCB-RMNH: INDONESIAN NEW GUINEA, Egemendora [Paniai Regency], midden X.1939, Nieuw Guinea Exp. K.NAG., leg. Eyma [antennae lost].
Close to *O. roesleri,* however bigger and different in colouration. In frontal view above the clypeal triangle there are reddish triangles on its left and right sides.






1♀ TELNOV: Doberai Peninsula, Ayamaru vill., 2,5-2,1 km NW, forest along Framu creek, 1°15'30''S 132°11'13''E, ~310-265 m, primary lowland rainforest on limestone, 3.IX.2015, leg. D. Telnov [antennae lost]; 1♀ TELNOV: Doberai Peninsula, Ayamaru vill., ~23 km SE, Aqafu spings, 1°23'15''S 132°22'04''E, ~330-340 m, primary lowland rainforest on limestone, near the spring, 4.IX.2015, leg. D. Telnov [antennae lost].
Not assignable to the known species from Doberai Peninsula (*O. limosina, O. pushkari, O. cygnicollis*). It seems to be closely related to *O. bomberaiensis*, but is visibly bigger than the species from the Bomberai Peninsula. Likely new species.

2♀, 1♂ BPBM: PAPUA NEW GUINEA, [East Sepik Prov.], Angoram [4°3'S 144°4'E], 20-30 m, 14.-16.VIII.1969, leg. J. L. & M. Gressitt [all antennae lost].

1♀, 1♂ BPBM: PAPUA NEW GUINEA, [East Sepik Prov.], Amok [3°35'S 142°57'E], 165 m, 6.I.1960, leg. T. C. Maa [antennae lost or damaged].

1♀ BPBM: PAPUA NEW GUINEA, East Sepik Prov., Dreikikir [3°35'S 142°46'E], Palms, 350 m, 24.VI.1961, leg. J. L. & M. Gressitt [antennae lost]. 1♀ nymph BPBM: PAPUA NEW GUINEA, Sepik Distr., Dreikikir, 350 m, 25.VI.1961, leg. J. L. & M. Gressitt.

1♂ BPBM: INDONESIAN NEW GUINEA, Morobe Prov., Mt. Lawson [7°44'S 146°37'E], 50-200 m, on *Trema orientalis*, 16.III.1974, leg. Gressitt & Reni.

1♀ BPBM: PAPUA NEW GUINEA, Morobe Prov., Kuper Range, 25 km SE Salamaua [7°15'S 146°57'E], 25.-26.I.1969, leg. J. Sedlacek.
The specimen is close in morphology to *O. kaitani* but is found significantly outside the distribution area. More specimens from Kuper Range are needed to assign identity of this population.

One species that is not described because of lack of physical specimens was photographed by a few authors in Muller Range (Papua New Guinea) - among them Piotr Naskrecki (Plate 104 fig. 5, plate 123 figs 2 & 5) and David Rentz. There are no specimens collected in Muller Range and after studying the photos it is obviously a new species.

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Taxonomic notes on *Acalolepta mixta* (Hope, 1841) and *Acalolepta vastator* (Newman, 1847) (Coleoptera: Cerambycidae)

FRANCESCO VITALI

Nationalmusée fir Naturgeschicht, rue Münster 25, L-2160, Luxembourg, Luxembourg; e-mail: fvitali@mnhn.lu

Abstract: *Acalolepta mixta* (Hope, 1841) is considered as a senior synonym of *Dihammus bispinosus* Breuning, 1935 syn. nov., *Acalolepta bispinosipennis* Breuning, 1969 syn. nov., *Acalolepta sumbawana* Breuning, 1969 syn. nov. and *Acalolepta savoensis* Breuning, 1979 syn. nov. *Acalolepta vastator* (Newman, 1847) bona species is removed from synonymy with *A. mixta* (Hope, 1841). The distribution of both species is updated and discussed.

Key words: Coleoptera, Cerambycidae, Lamiinae, Lamiini, *Acalolepta*, taxonomy.

Introduction

The enormous species richness of Australasian Lamiini, moreover dispersed on a huge surface and fragmented on different islands, has caused the description of many taxa, whose affinities were often underestimated. Stephan von Breuning (1894-1983) had the undeniable merit of providing the first worldwide keys to all species of Lamiinae; nevertheless, they were nearly exclusively based on the collection preserved in the Paris Museum. Moreover, the choise to use problematic characters (i.e. rapports cheeks/eye lobes and between antennomeres) and the rigidity of the schemas often led him to describe the same species more times, sometimes even in different genera. This situation markedly worsened already in the 1960's: the species were described summarily and compared with unrelated congeners, making impossible their identification without examining the types.

The photographs kindly provided by several colleagues through the Forum of the web-site www.cerambycoidea.com, including those of types preserved in different museums have allowed detecting many taxonomic mistakes.

In this paper, some taxa closely related to the Australian *Acalolepta mixta* (Hope, 1841) are examined, keeping the revision of this genus already treated in previous papers (Vitali 2016; 2017).

Abbreviations used in the text:

CFV – Collection Francesco Vitali, Luxembourg, Luxembourg;
MNHNP – National Museum of Natural History, Paris, France;
MNHNL – National Museum of Natural History, Luxembourg, Luxembourg;
OUMNH – Oxford University Museum of Natural History, United Kingdom.

Taxonomic part

***Acalolepta mixta* (Hope, 1841)** (Plate 125 figs 1-7)
Monohammus mixtus Hope, 1841: 48 (Australia, Northern Territory: Port Essington); Hope 1842: 428; Gahan 1893: 190.
Monohammus fistulator (Germar): Aulmann 1912: 20-21, fig. 15; 1913: 21-22, fig. 17 misidentification.
Monochamus mixtus (Hope): Aurivillius 1921: 98.
Dihammus bispinosus Breuning, 1935: 59 **syn. nov.** (Vietnam: Quang-Tri); 1944: 495.
Dihammus mixtus (Hope): Breuning 1944: 494–495; MacKeown 1947: 122; Duffy 1963: 164; Danilevsky & Kompantsev 1979: 230; Hawkeswood 1990: 100; Moulds & Bannink 2012: Tab. 1.
Acalolepta bispinosipennis Breuning, 1969: 664 **syn. nov.** (Indonesia: Sulawesi)
Acalolepta sumbawana Breuning, 1969: 664 **syn. nov.** (Indonesia, Lesser Sunda: Sumbawa)
Acalolepta savoensis Breuning, 1979: 100 **syn. nov.** (Indonesia, Lesser Sunda: Savu)






Acalolepta mixta (Hope): Vitali & Casadio 2007: 21, 23, Fig. 14; Goussey 2007: 641; Ślipiński & Escalona 2013: 39, 81-82.
Acalolepta mixtus (Hope): Chin et al. 2010: 10-11; Chin & Brown 2015: 1-2, figs 1-4 misspelling.

Examined material: *Monochammus mixtus* OUMNH: Syntype ♂, *mixta* / Hope N. A. (handwritten on a white label), TYPE (underlined) / Hope / Ann. Nat. / Hist. 1842 / P. 428 / Coll. Hope Oxon. (handwritten on a white label with red borders), TYPE COL 1823 1/3 / Monohammus / mixtus Hope / HOPE DEP: OXFORD (Plate 125 fig. 1).
1♀ MNHNL: [Australia], Queensland, acquisition 1925.
1♀ CFV: Solomon Is., Bellona, 7-III-1998, on a dry tree in day-time, C. A. Casadio lgt. (Plate 125 fig. 7).
Examined material: *Dihammus bispinosus* MNHNP: Holotype ♂, Quang-Tri / Annam (handwritten by Pic in a yellowish label), *Dihammus bispinosus mihi Typ.* det Breuning (handwritten by Breuning and printed on a white label), type (handwritten on a yellow label), Museum Paris / Coll. M. Pic (printed on a white label), HOLOTYPE (printed on a red label) (Plate 125 fig. 3).
Examined material: *Acalolepta bispinosipennis* MNHNP: Holotype ♀, Celebes M. (printed on a whitish label), *Acalolepta bispinosipennis mihi Typ.* Breuning dét. (handwritten by Breuning and printed on a white label), TYPE (printed on a red label) (Plate 125 fig. 4).
Examined material: *Acalolepta sumbawana* MNHNP: Holotype ♀, Sumbawa / Collfs (printed on a whitish label), *Acalolepta sumbawana mihi Typ.* Breuning dét. (handwritten by Breuning and printed on a white label), TYPE (printed on a red label) (Plate 125 fig. 5).
Examined material: *Acalolepta savoensis* MNHNP: Holotype ♂, Savu, I. / VIII-[18]96 / [A.] Everett (printed on a whitish label), *Acalolepta savoensis mihi Typ.* Breuning dét. (handwritten by Breuning and printed on a white label), TYPE (printed on a red label) (Plate 125 fig. 6).

Remarks: According to Wheeler (1911), the description of *Monohammus mixtus* appeared split in two numbers of the Proceedings of the Entomological Society of London: on 5th July (II) and on 1st November (III) 1841. The Proceedings from 1840 to 1846 were printed in ten sheets of 16 pages, which were distributed gratis to members and sold to the public. Their numbers were very scarce and the Society did not possess a single copy in 1911. Some museums bound them; however, they were reprinted in 1864 respecting the original state. According to Wheeler, the actual date "for all purpose of priority" for this description is 1st December 1841. Hope's description stated: *"Caenosus, colore nigrescenti marmoratus; thorace spinoso punctis sparsim notatis; elytris bispinosis concoloribus; corpore infra grisescenti, tarsis supra, et infra auricomatis. Long. lin. 11 [~23 mm], lat. lin. 3½ [~7.5 mm]"* The type(s) came from Port Essington, a 19th century's British settlement sited on the Cobourg Peninsula and still abandoned in 1849. It is located in Northern Territory, not in Queensland as Breuning (1944) claimed. The species is well characterised since the apex of each elytron is armed with two spines (*"elytris bispinosis"*). Moreover, the scape is peculiarly covered with sparse recumbent white setae. Breuning (1944) established an erroneous synonymy between *M. mixtus* and *M. vastator*, which all British and Australian entomologists overlooked. Afterwards, he described other species showing analogue characters (Breuning 1969; 1979). The examination of the types of *Dihammus bispinosus, Acalolepta bispinosipennis*, *A. sumbawana* and *A. savoensis* (Plate 125 figs 3-6) have allowed verifying that these species perfectly correspond to *A. mixta.* The claimed differences in proportion of cheeks, punctation and apical spines are relative characters within the variability of the species, whereas the more or less pubescent aspect of the elytral punctures is a banal consequence of the age of the specimen. Breuning (1979) described *A. savoensis* as coming from "Savo" (Solomon Is.). Actually, the locality label refers "Savu" (Lesser Sunda Islands, Indonesia), correspondingly to the explorations made by Alfred Everett in the Sunda Islands (Boulenger 1897).
Distribution: *A. mixta* is a species with a marked tendency to disperse. Already Gahan (1893) noticed that the species, widespread in Northern Australia and adjacent islands, was also present in the British Museum with specimens coming from Hong Kong and Java. Another specimen has been recently collected in Singapore as well (Loong Fah lgt., image available on www.cerambycoidea.com), strengthening Gahan's record. *Dihammus bispinosus* was described from Quang-Tri (Vietnam), a locality which Breuning (1944) presumed to be wrong, adding "Australia" as possible native country. On the contrary, a passive anthropogenic introduction was possible, considering the dispersion capability of this species and the fact that Quang-Tri is a coastal region. The main reason of this tendency is that the larvae bore several cultivated plants, including *Theobroma cacao* L. (Aulmann 1912; Breuning 1944) and *Mangifera indica* L. (Chin et al. 2010; Chin & Brown 2015), which probably act as vectors of anthropogenic introduction. Moreover, the species is also related to *Ficus* spp. and *Excoecaria agallocha* L. (Duffy 1963; Hawkeswood 1990; Chin & Brown, 2015), plants widely distributed from India to Australia that






are heavily protected by a milky latex under the bark. Probably, this latex contains the necessary nutrients for the development of larvae (Hawkeswood, 1990) but it might also reduce the competition among the consumers, favouring species able to exploit it (L.F Cheong in litt.).

According to the verified data, *A. mixta* is widespread in northern and eastern Australia, where it is native, and the Solomon Islands (Bellona). The present-day occurrence in other regions (Hong Kong, Vietnam, Singapore, Java, Sulawesi, Savu and Sumbawa) must be verified. The presence on Lord Howe I. (Breuning 1944; Vitali & Casadio 2007) derives from Olliff (1889) and must be referred to *A. vastator*.

***Acalolepta vastator* (Newman, 1847) bona species** (Fig. 1)

Monohammus vastator Newman, 1847: 1677 (North-eastern Australia); Matthews 1997: 14.
Monohammus rusticator (Fabricius): Aulmann 1912: 19-20, fig. 14; 1913: 20-21, fig. 16 partim?
Monohammus fistulator (Germar): Olliff 1889: 79, 97-98; Froggatt 1919: 37, 39; French 1919: 117-119, figs 1-4; Froggatt 1923: 142, figs 1-4; Froggatt 1930: 6 misidentification?
Haplohammus vastator (Newman): Aurivillius 1917: 27.
Monochamus vastator (Newman): Aurivillius 1921: 99.
Dihammus mixtus (Hope) Breuning 1944: 494 misidentification.
Dihammus vastator (Newman): MacKeown 1947: 122; Duffy 1963: 161-163; Hawkeswood 1990: 101; IHS 2000: 11.
Acalolepta vastator (Newman): Goodwin et al. 1994; Goodwin & Pettit 1994; Hadlington & Johnston 1998: 53; Peláez Rivera et al. 2004: 40; Goodwin 2005: 170-173; Jourdan 2006 : 228 ; Di Mani et al. 2014: 82; Dunn & Zurbo 2014: 7, fig. 16; Mazaheri et al. 2015: 262.

Examined material: None.

Remarks: Newman (1847) introduced *Monohammus vastator* with the following description: "Entirely dark brown, approaching to black, the dorsal surface of the prothorax and elytra being clothed with a short gray pubescence: this pubescence has a mottled appearance, occasioned by the presence of glabrous spots or patches, but as it appears the pubescence is very easily abraded, I cannot venture to decide whether the glabrous markings are natural or caused by causalities. The antennae are very long in the male, exceeding by one-half the length of the body; the protibiae have a very distinct tooth near the extremity. A number of specimens were taken, some of them very fine, and the males appear to be much larger than the females. Length of the body 1.2 inches [~3 cm], breadth .4 inch [~1 cm]; expansion of the antennae 5½ inches [~14 cm]." The types "were brought over from Australia by Lieutenant M.R. Ince, late of H.M.S. Fly". In all likelihood, H.M.S Fly is the18-gun sloop of the Royal Navy that explored much of the Australian North-eastern coast and neighbouring islands and gave the name to the Fly River of Papua New Guinea (Wikipedia). Thus, the typical locality of *M. vastator* must be referred to the North-eastern regions of Australia. The original description contains a mistake since antennae cannot contemporaneously exceed "by one-half the length of the body" and be 14 cm long, if the body is only 3 cm long. However, *A. vastator* shows protibial teeth typical of *Acalolepta rusticatrix* (Fabricius, 1801), a character that led several authors (Aulmann 1912; 1913; Olliff 1889; French 1919; Froggatt 1919; 1923; 1930) to indentify it with this species or with its synonym *Lamia fistulator* Germar, 1824. Breuning (1944) synonymised *A. vastator* with *A. mixta* without checking the types, both preserved in Great Britain and inaccessible to him. Actually, the original descriptions did not suggest this synonymy either since they mention two peculiar characters (the bispinose elytral apices of *A. mixta* and the protibial teeth of *A. vastator*) that make the species unmistakable. Accordingly, British and Australian authors overlooked this synonymy and kept using both names. For a long time, the Passion Vine Longicorn or Fig Longicorn *A. vastator* has been considered a pest of many plants (Duffy 1963; Hawkeswood 1990), especially grapevines (French 1919; Froggatt 1919; Goodwin et al. 1994; Goodwin & Pettit 1994; Peláez Rivera et al. 2004; Goodwin 2005; Di Mani et al. 2014; Dunn & Zurbo 2014; Mazaheri et al. 2015), figs (Froggatt 1923; 1930; Hadlington & Johnston 1998) and papayas (IHS 2000). The literature mentioning "*A. vastator*" is so prevalent that the formal revalidation of the species is even pleonastic; nonetheless, some recent books (e.g. Ślipiński & Escalona 2013) still consider *A. vastator* as a synonym of *A. mixta*. Unfortunately, the typical series seems to be lost: the specimens ranged under *A. mixta* do not include labels saying "*vastator*" or anything in Newman's handwriting. According to Maxwell V.L. Barclay (The Natural History Museum, London, United Kingdom), Newman's collection was dispersed and only a part of it ended up in the British Museum, mostly



via the "Entomological Club" and various private collectors (M. Geiser in litt.). Specimens referable to this species are not present in the Oxford Museum of Natural History either (A.D. Spooner in litt.). However, the habitus of *A. vastator* is clearly different from that of *A. mixta*, as drawings of past authors prove (Aulmann 1912; 1913: French 1919; Froggatt 1923; 1930). Since the type got lost, I designate as the lectotype the specimen figured by French (1919: fig. 4) according to the ICZN, 1999, Art. 74.4 (designation by means of an illustration or description). This designation does not solve the problem of the true identity of this species: the misidentification with other Australian congeners is still very probable. Some of them - *A. aureofusca* (Aurivillius, 1917), *A. aureosericea* (Breuning, 1936) and *A. tenuis* (Breuning, 1938) - are possibly synonyms of *A. vastator*, as well as *A. rusticatrix*, whose exact distribution remains to be defined.

Distribution: Due to past misidentifications, the distribution of this species is difficultly traceable. Possibly, it is at least widespread in eastern Australia, Kangaroo Island (Froggatt 1923) and Lord Howe Island (Olliff 1889).

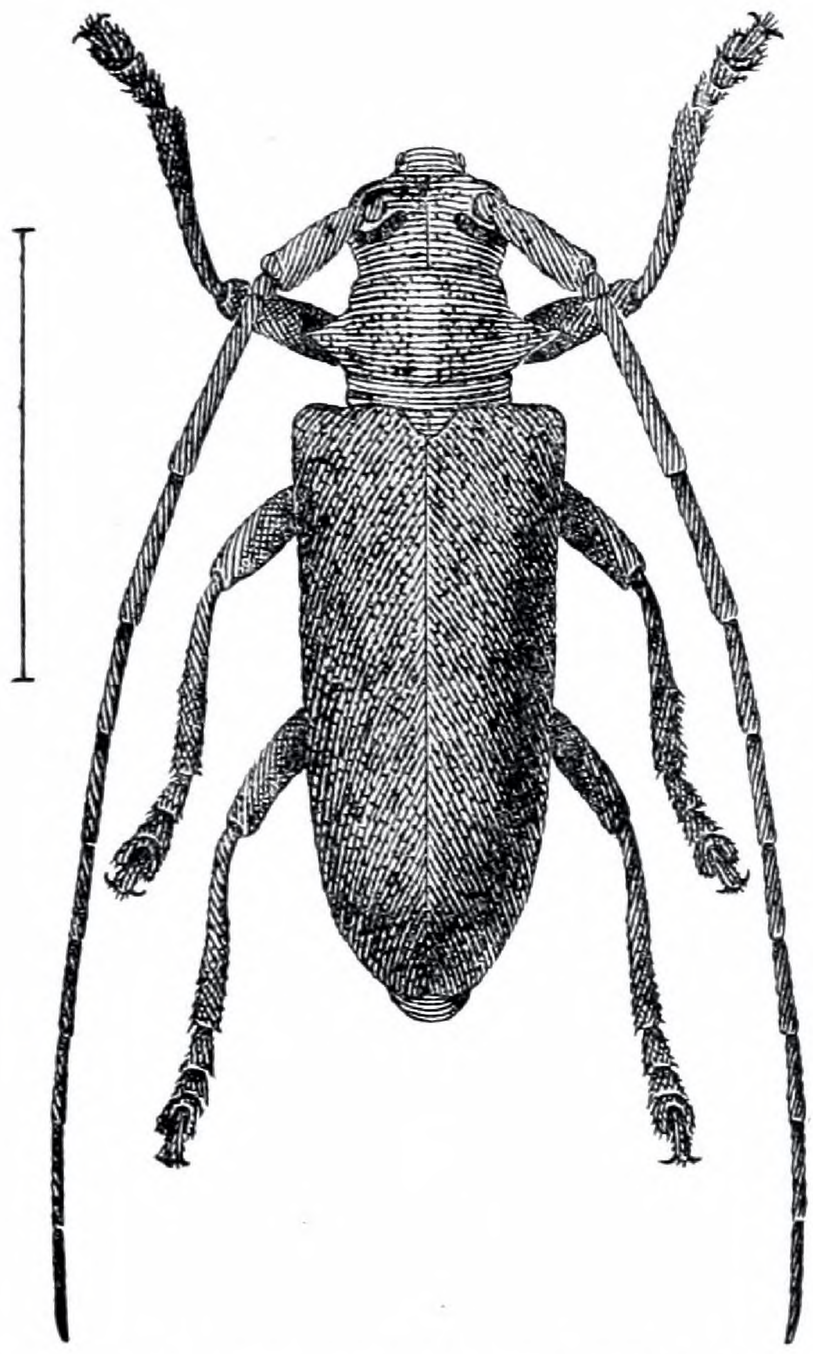


Figure 1. *Acalolepta vastator* (Newman, 1847), iconotype ♀, habitus, dorsal view (scale bar indicates the body length of depicted specimen and corresponds to 1.2 inches or ~3 cm).

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The *Cyana* Walker, 1854 species of New Guinea, with description of a new subgenus, eight new species and one new subspecies (Lepidoptera: Erebidae: Arctiinae: Lithosiini)

ROB DE VOS

Naturalis Biodiversity Center, Department of Entomology, Darwinweg 2, NL-2333 CR, Leiden, The Netherlands; e-mail: rob.devos@naturalis.nl

Abstract: A review is given of the *Cyana* Walker, 1854 species occurring in New Guinea and adjacent islands. Three subgenera are recognized in the region of which one new to science: Subgenus *Cyana* Walker, 1854, *Clerckia* Aurivillius, 1882 and *Cryptanaema* subg. nov. A total of 23 species are found in New Guinea and nearby islands of which 8 new species were discovered and are described here. Subgenus *Cyana* is represented in New Guinea by 2 species of which *binigrofasciata* sp. nov. is new to science. Taxon *Clerckia* is retained from synonymy and considered to be of subgenus status and is represented in New Guinea by 8 species of which 3 are new to science: *posthyalina* sp. nov., *dentimarginata* sp. nov. and *simonthomasi* sp. nov. On the other hand two genera are synonymized: *Exotrocha* Meyrick, 1886 syn. nov. (type species *liboria* Stoll, 1782) and *Sphragidium* Butler, 1887 syn. nov. (type species *miles* Butler, 1887) and are considered to be junior synonym of *Clerckia.* The new subgenus *Cryptanaema* subg. nov. is almost exclusively occurring in New Guinea (one species occurs in Queensland, Australia) with 13 species of which 4 are new to science: *albimarginalis* sp. nov., *molbakon* sp. nov., *zwieri* sp. nov. and *gracilis* sp. nov. One new subspecies is described: *Cyana* (*Cryptanaema*) *melanoplagia extrema* ssp. nov. 10 taxa are synonymized and one is a rejected senior synonym: *Chionaema tricolor dampierensis* Rothschild, 1916 syn. nov., *Chionaema tricoloris* Strand, 1922 syn. nov. and *Chionaema acutipennella* Röber, 1925 syn. nov. are junior synonyms of *Chionaema postdivisa* Rothschild, 1913 (= *Cyana* (*Clerckia*) *tegyra postdivisa*). *Chionaema dinava* (sic) *vulcanica* Rothschild, 1916 syn. nov. is a junior synonym of *Dyphlaebia tricolora* Butler, 1877 (= *Cyana* (*Clerckia*) *tricolora*); *Chionaema dinawa* Bethune-Baker, 1904 syn. nov. is a junior synonym of *Clerckia fulvia trigona* Rothschild, 1903 (= *Cyana* (*Clerckia*) *trigona*); *Chionaema bicolor* Rothschild, 1913 syn. nov. and *Chionaema croceizona* Hampson, 1914 syn. nov. are junior synonyms of *Clerckia thoracica* Rothschild, Jordan, 1901 (= *Cyana* (*Clerckia*) *thoracica*); *Chionaema nigromarginata* Rothschild, 1936 syn. nov. from New Britain is a junior synonym of *Chionaema flavicaput* Gaede, 1925 (= *Cyana* (*Clerckia*) *flavicaput flavicaput*); *Scaptesyle aroa* Bethune-Baker, 1904 homonym nov. is a homonym of *Chionaema aroa* Bethune-Baker, 1904 in the subgenus *Cryptanaema,* and is a rejected senior synonym of *Chionaema nigroplagata* Bethune-Baker, 1910 (= *Cyana* (*Cryptanaema*) *nigroplagata*); *Chionaema nigrescens* Rothschild, 1913 syn. nov. is a junior synonym of *Chionaema charybdis* Bethune-Baker, 1904 (= *Cyana* (*Cryptanaema*) *charybdis*) and finally *Chionaema melanochlorus* Rothschild, 1916 syn. nov. is a junior synonym of *Chionaema fumea* Hampson, 1900 (= *Cyana* (*Cryptanaema*) *fumea*). All species are reviewed and redescribed and the adults and genitalia are depicted.

Key words: Review, *Cyana, Clerckia, Cryptonaema*, New Guinea.

Introduction

The genus *Cyana* Walker, 1854 comprises about 200 recognized species of which the majority is distributed in the Indo-Australian region and a smaller part in tropical Africa.

It is a genus which has been subject to confusion, splitting and lumping for a long time by many authors. At the moment no less than 10 synonyms are known for the genus *Cyana*.

The frequently used synonymic name *Chionaema* was often wrongly referred to Herrich-Schäffer, 1850 where in fact it should be 1855. This caused many times shifts in presumed validity and synonymy of respectively *Cyana* (1854) and *Chionaema* (1850/1855). However, Roepke (1946) and Roesler & Küppers (1976) showed that *Chionaema* is in fact published by Herrich-Schäffer in 1855 and





thus a junior synonym of *Cyana* Walker, 1854.

Most species in Africa and Southeast Asia have a white appearance with orange-red and black transverse lines in all kinds of variations and combinations, often together with one or some more or less distinct discal spots. Some species have more complicated and colourful pattern like in The Philippines and near the Himalayas. More eastward from the Moluccas to the Solomon Island species have a more cryptic pattern or are dominantly orange-red with black rims. The diversity in pattern resulted in the past in grouping the species in separate genera, by some lumped or split again in one or more genera. Even after study of the genitalia the confusion remains. When focusing on genitalia structures alone the genus would fall apart in numerous pieces while we don't really understand what kind of process is behind this variation.

Among others Roepke (1946), Roesler & Küppers (1976) and Holloway (2001) give a clear view of the variable and complex genus which, according to them, can at the most be divided in species groups. Karisch (2013) splits in his comprehensive revision of the African species the genus in many subgenera, mostly retaining already existing synonyms, but by doing this only adding to the confusion and using all kind of (plesiomorphic or apomorphic) variations and structures possible to confirm this. Holloway (2001), following Nielsen et al. (1996), states that the many different structures found in genitalia and wing pattern should be considered to be secondary sexual features within the range of variation of the genus *Cyana*. And indeed, having studied all known species from New Guinea, the variation in wing pattern and genitalia structures are quite variable, sometimes not matching with the logical grouping of the species after external characters.

For the moment it seems wise not to split the genus *Cyana* in other genera without understanding what kind of grouping is justified. Therefore more study material is necessary.

Variation or not, there are some characters that hold the genus in general together. The most distinct feature is the androconial pouch just behind the costa or on the costal rim of the forewing of the males which in most cases disforms the costal rim to a knot or pocket. The male genitalia form perhaps the less reliable features to hold the genus together, although the cornuti on the vesica of the aedeagus may indicate species groups or subgenera within the genus as do some structures of the valvae, but the female genitalia on the other hand show more uniform characters, having a large appendix bursa in all species, in some species even larger than the bursa copulatrix itself. The size and shape of the cervix bursae and the number and position of the signa on the bursa copulatrix may be strong distinguishing characters again for species groups.

Following Holloway (2001) applying, "seek to identify distinct groupings within the complex as a first step to elucidating relationships", an attempt is made in this review to group apparently allied species from New Guinea into subgenera. In this review the number of subgenera is limited to three and in the almost endemic new subgenus from New Guinea still some species groups are recognized. It is premature to understand the status of these species groups (i.e. being (sub)genera or not), more research with more material and modern techniques is necessary.

Finding new species apparently is inevitable when studying insects from such a still poorly explored area as New Guinea, not only in collected material from remote areas that are just recently accessible but also in old collections, having been overlooked for many decades. In this review no less than 8 new species of *Cyana* are described out of totally 23 known species from New Guinea until now, and probably more will follow in the near future.

Materials and methods

The studied material is stored in the collections of The Natural History Museum in London (United Kingdom), Naturalis Biodiversity Center in Leiden (The Netherlands) and Koleksi Serangga Papua in Waena (Papua, Indonesia). Of all studied species the genitalia were dissected, preparated and depicted when available.

The dissected genitalia are put in cold KOH 10 % for one night. After washing and cleaning from fat, scales and dirt in 30% alcohol the genitalia where stained in a solution of chlorazol-black in 30% alcohol and affixed in 95% alcohol. Then the genitalia were prepared for preservation in Euparal Essence (to prevent air bubbles) and after a few minutes put on a glass slide in a few drops of Euparal medium on the standard as used in the Natural History Museum in London: abdomen on left side, genital armature top right, aedeagus bottom right. To prevent the smaller parts, like aedeagus, from floating the Euparal drops were left to dry at least 24 hours without glass cover in a closed petri-dish (to protect against dust). The next day a proper






sized glass cover was put on the preparate in the sticky Euparal with addition of a few fresh drops of Euparal. This complete preparate is left to dry for weeks to months in the petri-dish. Proper slide labels are added after completely drying, so therefore it is necessary to write preparate number and details on the petri-dish cover and to scratch the number on the glass slide to avoid mixing up with other drying slides.

Slides were studied with a WILD M3 binocular microscope with magnifications 60-400x. Digital photographs were made with a motorized Zeiss V20 binocular microscope and a digital Axio MRc5 camera controlled by Axiomanager M2 software.

Forewing lengths were measured with a digital caliper from forewing base to apex, numbers were rounded to 0.5 millimeters. The taxa are as far as possible listed systematically or in geographical order from west to east.

Abbreviations used in the text:

mm – millimeters;
BM – initial for "British Museum", Natural History Museum, London, United Kingdom;
RV – initial for "Rob de Vos", preparator of genital slides;
BMNH – Natural History Museum (former British Museum for Natural History), London, United Kingdom;
KSP – Koleksi Serangga Papua (former collection of Br. Henk van Mastrigt), Waena, Papua, Indonesia;
RMNH – Naturalis Biodiversity Center (former Rijksmuseum voor Natuurlijke Historie and Nationaal Natuurhistorisch Museum), Leiden, The Netherlands;
UNCEN – Universitas Cenderawasih, Waena, Papua, Indonesia;
ZMA – Naturalis Biodiversity Center (former Zoölogisch Museum van Amsterdam), Leiden, The Netherlands.

Taxonomic part

Cyana Walker, 1854
Type species: *Cyana detrita* Walker, 1854

Subgenus **Cyana Walker, 1854**
= *Bizone* Walker, 1854
Type species: *perornata* Walker, 1854
= *Doliche* Walker, 1854
Type species: *gelida* Walker, 1854
= *Isine* Walker, 1854
Type species: *trigutta* Walker, 1854
= *Chionaema* Herrich-Schäffer, 1855
Type species: *puella* Drury, 1773
= *Macronola* Kirby, 1892 (unnecessary replacement name for *Cyana* Walker, 1854)

The nominotypical subgenus is by external characters distinguished by mainly white species with reddish or yellow transverse lines, sometimes bordered black, and with one, two or three discal spots or none at all. Species with broader transverse bands or with more coloration are present in this group. In fact there is a wide variation in genitalia structures but the basic construction is that of typical Lithosiini, elongated with a long extended sacculus with a sharp curved thorn, sometimes the valves being divided into two equal halves. The vesica of the aedeagus in most cases has numerous needle shaped cornuti in one bunch distally. Females with a sclerotized cervix bursae and a large globular bursa copulatrix with usually two signa, accompanied by an almost equal sized appendix bursae, with only slightly or no additional sclerotization of the bursa surface other than the signa.

Subgenus *Cyana* comprises the majority of the species in the genus and is widely distributed in Africa, Southeast Asia to The Philippines, Sulawesi and with only two species in the Moluccas: *Cyana (Cyana) pura* (Van Eecke, 1926) (Buru) and *Cyana (Cyana) impunctata* (C. Felder, 1861) (Ambon), and two species which are probably the easternmost representatives of the typical subgenus: *Cyana (Cyana) transfasciata* (Rothschild, 1912) and *Cyana (Cyana) binigrofasciata* sp. nov., both from New Guinea. It is out of the scope of this review to mention all other numerous species of this subgenus from western regions. African species are treated by Karisch (2013), Oriental species are partly treated by Roepke (1946), Roesler & Küppers (1976), Cerny (1993), Holloway (2001) and in numerous smaller publications by many authors.

Some authors also treat the Australian *Neobrocha* Meyrick, 1886 and African *Lexis* Wallengren, 1863 to be included in the list of synonyms but these are here considered valid genera. Both are in wing shape as well as in genitalia structures clearly different from *Cyana*.

Checklist of *Cyana* (*Cyana*) from the Moluccas and New Guinea eastwards

pura (Van Eecke, 1926) [Buru]
impunctata (C. Felder, 1861) [Ambon]
transfasciata (Rothschild, 1912) [Papua]
binigrofasciata **sp. nov.** [Papua]






Descriptions of the New Guinea species

***Cyana (Cyana) transfasciata* (Rothschild, 1912)** (Plate 126 figs 1-2, plate 133 figs 1-2, plate 139 figs 3-5)

Lectotype ♂ BMNH [designated here from syntype series]: nr. Oetakwa R., Snow Mts., Dutch N.G., up to 3500 ft., x.xii.1910 (Meek).

Paralectotypes 1♂ & 1♀ BMNH: nr. Oetakwa R., Snow Mts., Dutch N.G., up to 3500 ft., viii.1910 (Meek).

References: *Ilema transfasciata* Rothschild, 1912. *Novitates zoologicae* 19 (2): 222; Draudt (1914: 208), as *Lithosia transfasciata*; Strand (1922: 586), as *Eilema transfasciata*; Strand (1922: 898), as *Chionaema transfasciata*.

Diagnosis: Forewing length 13-14 mm. Head, thorax and abdomen sand-yellow, with the middle section of the abdomen dorsally bone-white. Forewing in male with an elongated costal pouch running from base to two-third of the wing, where the costal rim is bent in a blunt angle. Wings of female normal shaped. Forewings bone-white, but with the wingbase and marginal field sand-yellow, in males also the costal rim sand-yellow. Males with four black transverse lines, broader than the five transverse lines in the female. The similarity with the typical patterned *Cyana* species from the Malesian region with black transverse lines is therefore obvious. Hindwings pale yellow. At the underside the pattern is obscure.

Male genitalia [gen.prep. BM-RV1528]: Uncus finger-shaped, near apex slightly curved. Tegumen broad, only slightly sclerotized. Saccus with a shallow ridge with a blunt angled rim at the inside of the vinculum bottom. Juxta well developed, "V"-shaped. Valvae rather narrow. Cucullus with distal part membranous and covered with setae. Clasper forming a narrow oval folded pocket, ending in a sharp thorn. Sacculus with a long and narrow extension with a small blunt finger-shaped apex. Aedeagus short, vesica with two lobes, distally with a group of numerous short needle-shaped cornuti, all pointing in one direction.

Female genitalia [gen.prep. BM-RV1529]: Ostium wide, rim without strong sclerotization. Antrum not sclerotized. Cervix bursae wide but rather simple, with sclerotized wrinkles, attached to it is a small globular appendix bursae. Bursa copulatrix narrow and long with in the caudal part one small irregular shaped signum, consisting of a few thorns and spines.

Distribution: Only found in Papua, Indonesia, in Nomnagihé (near Nabire) and in the Snow Mountains at the Utakwa and Setekwa River.

***Cyana (Cyana) binigrofasciata* sp. nov.** (Plate 126 figs 3-4, plate 133 figs 3-4)

Holotype ♂ KSP: [INDONESIA], Irian Jaya, Sarmi, Mamberamo Tengah, Marina Valen, Gn. Acaua, 540 m, 17-20.VII.2004, H.J.M. van Mastrigt.

Paratype 1♂ RMNH: same as holotype.

Derivatio nominis: The name *binigrofasciata* refers to the only two black transverse bands on the forewing in the male.

Diagnosis: Forewings 11 mm. Head, thorax and abdomen as in the previous species. Groundcolour of forewings bone-white, very similar and obviously closely allied to *Cyana transfasciata* but smaller and in the male with only two black transverse lines and one small curved basal band which does not reach the dorsum. The sand-yellow margin does not reach the distal black transverse lines. Hindwing sand-yellow. Female unknown.

Male genitalia [gen.prep. KSP24241]: Uncus more slender and longer than in the previous species, finger-shaped and slightly bent. Tegumen broad and slightly sclerotized. Saccus not developed, vinculum bottom solid with a shallow ridge. Juxta "V"-shaped, stronger developed than in *transfasciata*. Valvae broader than in *transfasciata*, broadening towards apex. Cucullus with membranous distal part, covered with setae. Clasper forming a folded pocket, broader than in *transfasciata*, with a broad thorn. Sacculus broad, distally tapering and with a small sharp finger-shaped apex. Aedeagus broad and short, vesica with two lobes. Distally a group of numerous needle-shaped cornuti all pointing in the same direction, longer than in *transfasciata*.

Distribution: This species is until now only known from Marina Valen, in the Mamberamo River area between the Van Rees Mountains and the Foja Mountains.

Subgenus ***Clerckia* Aurivillius, 1882 stat. nov.**

Type species: *Phalaena fulvia* Linnaeus, 1758

= *Exotrocha* Meyrick, 1886 **syn. nov.**

Type species: *liboria* Stoll, 1782

= *Sphragidium* Butler, 1887 **syn. nov.**

Type species: *miles* Butler, 1887

= *Gnophrioides* Heylaerts, 1891

Type species: *flaviplaga* Heylaerts, 1891

= *Leptothrix* Heylaerts, 1892

Type species: *tettigonioides* Heylaerts, 1892 preoccupied

Clerckia Aurivillius, 1882, with type species *fulvia* Linnaeus, 1758, may be model to the group of






dominantly orange-red coloured species from New Guinea. The type species has its distribution in the Moluccas, two species, *flaviplaga* (Heylaerts, 1891) and *tettigonioides* (Heylaerts, 1892) live much more westwards in the Sunda Region, all other 15 species occur more eastwards in New Guinea, Australia or the Solomon Islands. All species are medium sized to large Lithosiini with quite long and narrow forewings, especially in the males where the androconial pouch is rather short and positioned on the costa at two-third from wingbase. *Exotrocha* Meyrick, 1886 and *Sphragidium* Butler, 1887 are herewith considered to be synonyms of *Clerckia* Aurivillius, 1882.

Males and females of all *Clerckia* species have black bipectinate antennae with scarce, short and thin cilia. Abdomen in all species black with blue shimmering scales, in males usually with a grey anal tuft.

Male genitalia of *Clerckia* species very similar to the nominotypical subgenus but with the aedeagus vesica more complex, with usually three or more lobes with fields of scobination and short needle- or teeth-shaped cornuti.

Checklist of *Cyana (Clerckia)*

flaviplaga (Heylaerts, 1891) [Java, Bali]
tettigonioides (Heylaerts, 1892) [Sunda Region]
= *haemacta* (Snellen, 1896)
fulvia (Linnaeus, 1758)
ssp. *fulvia* (Linnaeus, 1758) [Ambon, Seram]
= *liboria* (Stoll, 1782)
= *laticincta* (Walker, 1856)
ssp. *laudans* (Hulstaert, 1923) [Kai Islands]
metamelas (Hampson, 1914) [Papua]
posthyalina **sp. nov.** [Batanta Island]
dentimarginata **sp. nov.** [Papua]
tegyra (Druce, 1899)
ssp. *tegyra* (Druce, 1899) [East New Guinea, D'Entrecasteaux Islands]
ssp. *postdivisa* (Rothschild, 1913) [New Guinea] **comb. nov.**
= *tricolor* (Druce 1899) [homonym, nec sensu Swinhoe, 1892]
= *dampierensis* (Rothschild, 1916) **syn. nov.**
= *tricoloris* Strand (1922: 899) **syn. nov.**
= *acutipennella* (Röber, 1925) **syn. nov.**
ssp. *retracta* (Draudt, 1914) [New Britain]
tricolora (Butler, 1877) [Aru Islands, New Guinea]
= *tricolor* (sic) sensu (Swinhoe, 1892 nec Druce, 1899)
= *vulcanica* (Rothschild, 1916) **syn. nov.**
trigona (Rothschild, 1903) [New Guinea]
= *dinawa* (Bethune-Baker, 1904) **syn. nov.**
simonthomasi **sp. nov.** [Papua]
thoracica (Rothschild, Jordan, 1901) [New Guinea]
= *bicolor* (Rothschild, 1913) **syn. nov.**
= *croceizona* (Hampson, 1914) **syn. nov.**
meyricki Rothschild, Jordan, 1901 [Queensland]
flavicaput (Gaede, 1925)
ssp. *flavicaput* (Gaede, 1925) [New Britain]
= *nigromarginata* (Rothschild, 1936) **syn. nov.**
ssp. *basiflava* (Rothschild, 1936) **stat. nov.** [New Ireland]
scintillans (Rothschild, 1936) [New Ireland]
miles (Butler, 1887) [Solomon Islands]
= *cybdela* Rothschild, 1905 [Bougainville]
guizonis Jordan, 1904 [Solomon Islands]
omissa Rothschild, Jordan, 1901 [Solomon Islands]
securizonis (Butler, 1889) [Shortland Islands]
= *securinervis* (Kirby, 1892)

Descriptions of the New Guinea species

Cyana (Clerckia) metamelas (Hampson, 1914)

(Plate 126 figs 5-6, plate 133 figs 5-6)

Holotype ♂ BMNH: [Dutch] New Guinea., Mimika R., vii.1910, A.F.R. Wollaston., 1911-229, Chionaema metamelas, type ♂. Hmpsn.

References: *Chionaema metamelas* Hampson, 1914. *Catalogue of the Lepidoptera Phalaenae. Supplement, volume 1. Catalogue of the Amatidae and Arctiadae (Nolinae and Lithosianae) in the collection of the British Museum*. London, British Museum: 625; Strand (1922: 685), as *Chionaema metamelas*.

Diagnosis: Forewings male 15.5 mm. Head black with blue shimmering scales. Patagia and tegulae red. Prothorax and mesothorax dorsally red, metathorax black. Male with rather narrow forewing, costa at two-third with an elongated pouch which slightly retracts the costa. Forewings red with black costa, a broad black terminal margin, at dorsum in the tornus gradually decreasing in broadness towards base, at one-third from base only with a narrow black dorsal line. Hindwings triangular shaped, black. At the underside the red pattern on forewing more extended.

Wings of presumed female normal shaped. Forewing orange-red, towards base more orange coloured. Costa with rather broad black rim, continued along termen and in tornal area much broader, gradually narrowing till one-third towards base where the black rim ends. Hindwing yellow with a broad black terminal margin which at vein CuA1 has a blunt angle.

It is presumed that this female belongs to *metamelas* because the external features more or less









match with those from the male. It does not fit in any other known species but unfortunately it is not sure.

Male genitalia [gen.prep. NHMUK010313308]: Uncus rather short, finger shaped with a blunt apex and in the middle slightly constricted. Tegumen narrow. Valvae with a broad cucullus with broad apex rounded, at two-third somewhat constricted. Clasper on cucullus narrow triangular with a blunt apex, pressed against the cucullus surface. Sacculus narrow, extended and gradually curved upwards, apex sharp. Saccus without process. Aedeagus broad and short, vesica with at least four distinct lobes. At the base of the vesica a cornutus shaped as a rotary saw with numerous smaller teeth. A trunk-shaped ventral lobe without significant cornuti or sclerotization. A globular ventral lobe with a field of arrow-shaped cornuti and furthermore scobinated. The large central lobe ventrally with a band of small teeth, distally scobinated with tiny spikes. The dorsal lobes slightly scobinated but without distinct cornuti.

Female genitalia: Not studied because it is not sure yet that the presumed female really belongs to this species. Further research is necessary to identify the female of this species with certainty.

Distribution: So far only found in Papua, Indonesia: the male near Mimika River, the presumed female in Wangaar (near Nabire).

***Cyana (Clerckia) posthyalina* sp. nov.** (Plate 126 fig. 7, plate 133 figs 7-8)

Holotype ♂ RMNH: Indonesia, Irian Jaya, Batanta Island, south coast, 0°55'S - 130°40'E, 6-7.ii.1996, at light, ZMA-exp., 1996.

Derivatio nominis: The name *posthyalina* refers to the hyaline centre of the hindwings of the species.

Diagnosis: Forewings 14.5 mm. Head, (meso- and meta)thorax and abdomen black with a steel blue shimmer but with prothorax and base of patagia red. Anal tuft of abdomen red with a black central band. Legs black with steel blue scales. Forewing narrow and long, costa with a distinct pouch at two-third of wing length which slightly retracts the costa at this position. Forewings black with steel blue and purple shimmer. Hindwing hyaline in the centre, except for the black veins, and with a broad black dorsum and hind margin. Apex with purple shimmer. Underside identical to upperside. Female unknown.

Male genitalia [gen.prep. RV1544]: Uncus rather short (in fig. 63 pressed down on the left side), finger shaped with a blunt apex. Tegumen narrow. Valvae with a broad cucullus with broad apex rounded. Clasper on cucullus finger-shaped, pressed against the cucullus surface. Sacculus narrow, extended and gradually curved upwards, apex sharp and hooked. Saccus broad and shallow. Aedeagus broad and short, vesica with at least four distinct lobes, the ventral lobe being the largest, like a long tapering nightcap, which carries a broad scobinated band, ending in an impressive cornutus with five large teeth ventrally. Another cornutus situated at the base of the vesica, of about equal size of the previous described cornutus, shaped as a rotary saw with numerous smaller teeth and accompanied by a field of small teeth. Furthermore a dorsal and a lateral scobinated field, with tiny cone-shaped thorns.

Distribution: Until now only known from Batanta Island in the Raja Ampat Archipelago.

***Cyana (Clerckia) dentimarginata* sp. nov.** (Plate 126 fig. 8, plate 134 figs 1-2)

Holotype ♂ RMNH: [Dutch New Guinea], Andai, [1870], [C.B.H. von] Rosenb[erg]., Museum Leiden, C. fulvia L., Det :, Cat.No. 6.

Derivatio nominis: The name *dentimarginata* refers to the dentation on the inside of the black margin of the hindwing.

Diagnosis: Forewings 14.5 mm. Head black, frons with slightly red near base of antennae. Patagia and tegulae red. Meso- and metathorax and abdomen black, anal tuft dark grey. Legs dark brown with at the outerside pale blue scales. Forewing narrow and long, costa with a distinct pouch at two-third of wing length. Forewings red with black costa distally gradually broadening and continuing into a broad black hind margin which continues along distal half of dorsum where it is gradually narrowing and ends. The black colour with a bluish shimmer, especially at the pouch and fringes. Hindwing yellow with a broad black hind margin which is broader at the apex and at the dorsal half is dentated on the veins. Underside with the red coloration of upperside yellow, the black pattern somewhat extended and mixed with brown. Female unknown.

Male genitalia [gen.prep. RV1549]: Uncus short and finger shaped with a blunt apex, broadly based. Tegumen gradually broadening towards uncus. Valvae with a broad cucullus which gradually tappers distally. Apex of cucullus rounded. Clasper on cucullus triangular with a finger-shaped extension and pressed against the sacculus. Sacculus narrow, extended and gradually curved upwards, apex sharp. Saccus flat, without process. Aedeagus broad and






short, vesica with at least four distinct lobes, the ventral lobe being the largest which carries a broad scobinated band, distally with a large stretched triangular cornutus with numerous large teeth. A second cornutus situated at the base of the vesica, of about equal size of the previous described cornutus, shaped as a rotary saw with numerous smaller teeth and dorsally accompanied by a field of numerous teeth. Furthermore a distal and a lateral field with tiny cone-shaped thorns, the ones in the distal field being larger than those in the lateral field.

Distribution: Until now only known from Andai in the eastern Birdshead Peninsula near the Arfak Mountains.

***Cyana (Clerckia) tegyra* (Druce, 1899)**

ssp. ***tegyra* (Druce, 1899)** (Plate 127 figs 1-2, plate 134 figs 3-4)

Holotype *tegyra* ♂ BMNH: Fergusson Island, x.1894, leg. A.S. Meek, *Exotrocha tegyra* ♂, Type Druce.

References: Exotrocha tegyra Druce, 1899. Annals and Magazine of Natural History (7) 3: 235; Hampson (1900: 316), in part; Draudt (1914: 172), as Chionaema tricolor; Strand (1922: 692), as Chionaema tricolor tegyra; Strand (1922: 899), as Chionaema tricoloris tegyra.

ssp. ***postdivisa* (Rothschild, 1913) comb. nov.** (Plate 127 figs 3-4, plate 134 figs 5-6, plate 139 figs 6-7)

= *Chionaema tricoloris* Strand, 1922 **syn. nov.** *Lepidopterorum Catalogus 26: Arctiidae: Subfam. Lithosiinae.* W. Junk, Berlin: 899.

= *Chionaema tricolor dampierensis* Rothschild, 1916 **syn. nov.** *Novitates zoologicae* 23 (3): 327; Strand (1922: 692), as *Chionaema tricolor dampierensis*.

= *Chionaema acutipennella* Röber, 1925 **syn. nov.** *Stettiner entomologische Zeitung* 85: 187.

Holotype *tricolor* Druce ♂ BMNH: Trobriand Islands, Kiriwini, v.1895, leg. A.S. Meek, *Exotrocha tricolor* ♂, Type Druce.

Holotype *postdivisa* ♀ BMNH: British New Guinea, Lower Membaré River, v.1906, leg. A.S. Meek, *Chionaema postdivisa*, Type Rothschild.

Syntypes *dampierensis* 4♂ & 4♀ BMNH: British New Guinea, Dampier Island, leg. A.S. Meek, *Chionaema tricolor dampierensis.*

Holotype *acutipennella*: "Südwest-Neuguinea", type not found.

References: *Exotrocha tricolor* Druce, 1899 homonym (nec sensu Swinhoe, 1892). *Annals and Magazine of Natural History* (7)3: 235; Hampson (1900: 316), in part; Draudt (1914: 172); Strand (1922: 692), as *Chionaema tricolor*; Rothschild (1913: 192); Strand (1922: 688), as *Chionaema postdivisa.*

ssp. ***retracta* (Draudt, 1914)** (Plate 2 figs 13-14)

Holotype *retracta* ♂ BMNH: New Britain, 82-80, Chionaema tricolor ab. retracta Draudt, Holotype., Hampson Subsp. l.

References: *Chionaema tricolor retracta* Draudt, 1914. In: Seitz A. (ed.) *Die Gross-Schmetterlinge der Erde 10: Spinner und Schwärmer des Indo-Australischen Gebiets.* Stuttgart, A. Kernen: 172; Strand (1922: 692), as *Chionaema tricolor retracta.*

Diagnosis ssp. ***tegyra***: Forewings male 15.5 mm, female 17-19 mm. Head black with steel blue shimmering scales, especially on the frons. Patagia and tegulae red, base of tegulae black with blue iridescent scales. Meso- and metathorax and abdomen black, all with blue iridescent scales, anal tuft in male dark grey. Legs dark brown, at the outside blue iridescent scales. Forewing narrow and long, costa with a distinct pouch at two-third of wing length. Forewings red with black costa, at apex continued by a black hindmargin and in tornus broadly intruding into the red field until halfway the wing length. The black colour with a blue shimmer, especially at the costa. Hindwing yellow with a broad black hind margin which is broader at the apex, dorsum narrowly black. Underside with reduced red colour. Female as male but without the pouch at the forewing costa and much larger.

Diagnosis ssp. ***postdivisa*:** Forewings male 12-15.5 mm, females 15-18.5 mm. As in ssp. *tegyra* but smaller. Patagia entirely red. Forewing with the black margin at tornus not so broadly intruding into the red field but gradually narrowing along the dorsum to halfway the wing length. Underside with reduced red colour but less strong as in *tegyra*.

Diagnosis ssp. ***retracta*:** Forewings male 16 mm. Like *tegyra* s.s. but forewing with much broader black hindmargin and tornus which is intruding into the red field. Patagia entirely red. Female not studied but probably as in male.

Male genitalia [gen.prep. RV1545 (*tegyra*), RV1546 (*postdivisa*)]: Uncus long and finger shaped with a blunt apex, broadly based. Tegumen gradually broadening towards uncus. Valvae with a rather narrow cucullus, gradually tapering distally and with a rounded apex. Clasper on cucul-









lus broad, with a triangular extension and pressed against the sacculus. Sacculus narrow, extended and gradually curved upwards, apex sharp. Saccus flat, without process. Aedeagus broad and short, vesica with at least four distinct lobes, the ventral lobe with a field of tiny teeth and distally with a few larger cornuti, in *postdivisa* the field of tiny teeth on this lobe is concentrated in a band. At the base of the vesica a large bowl-shaped cornutus with numerous small teeth and dorsally accompanied by a field of numerous longitudinal teeth. Furthermore a large distal field of tiny teeth and dorsally a wide field of scattered small cone-shaped teeth.

Female genitalia [gen.prep. RV1547 (*postdivisa*)]: The core of the antrum completely sclerotized, flat, caudally with an oblique rim. Cervix bursae with the caudal part sclerotized and wrinkled. Bursa with distal part sclerotized and wrinkled, one large signum present which is a rounded patch with numerous tiny teeth. Appendix bursae large, about as large as the bursa itself, not sclerotized. Both, bursa and appendix, are broadly connected, almost forming one large bursa.

Distribution: Subspecies *tegyra* is found at the D'Entrecasteaux Islands, Goodenough Island, Fergusson Island, and smaller islands Northeast and East of New Guinea. Subspecies *retracta* is found on New Britain and New Ireland (Bismarck Archipelago). Subspecies *postdivisa* is found on the mainland of New Guinea and is very common.

***Cyana (Clerckia) tricolora* (Butler, 1877)** (Plate 127 figs 7-8, plate 134 figs 7-8)

= *Chionaema dinava* (sic) *vulcanica* Rothschild, 1916 **syn. nov.** *Novitates zoologicae* 23 (3): 327; Strand (1922: 680), as *Chionaema dinawa vulcanica.*

Holotype *tricolora*: ♀ BMNH, Aru Isd., A.R. Wallace, 54 - 48., *D. tricolora*, Butler Type.

Holotype *vulcanica*: ♀ BMNH, Vulcan Isl., xi.1913-i.1914, (Meek's Expedition), *Chionaema dinava vulcanica*, Type Rothsch.

References: *Dyphlaebia tricolora* Butler, 1877. *Transactions of the Entomological Society of London* 1877: 347; Swinhoe (1892: 126), as *Exotrocha tricolor* (sic) (nec Druce, 1899); Hampson (1900: 317); Draudt (1914: 172); Strand (1922: 682), as *Chionaema fulvia tricolora.*

Diagnosis: Forewings male 12.5-15.5 mm, female 16 mm. Head black with steel blue shimmering scales, especially on the frons. Patagia and tegulae orange. Meso- and metathorax and abdomen black, all with blue iridescent scales, anal tuft in male dark grey. Legs black with blue iridescent scales. Forewing in male narrow and long, costa with a narrow pouch at two-third of wing length. Forewings orange with narrow black costa, at apex narrowly continued by a black hindmargin (more narrow than in *tegyra*) and in tornus somewhat broader continued and gradually narrowing to halfway the wing length (more gradually than in *tegyra*). The black colour with a blue shimmer, especially at the androconial pouch. Hindwing deep yellow with a broad black hind margin which is broader at the apex, at the dorsum narrowly black. Underside with reduced yellow colour, the black border being more regular than in *tegyra*, the androconial pouch clearly visible as an isolated black patch. Female as male but without the pouch at the forewing costa and larger. The black margins of the forewing costa and termen broader. In the tornus the black margin like in male gradually narrowing towards halfway forewing length (in *tegyra* less gradually).

Male genitalia [gen.prep. RV1559]: Uncus rather long, broader than in *tegyra*, finger shaped with a blunt apex. Tegumen broad. Valvae robust, with a broad cucullus, gradually tapering distally and with a truncated apex. Clasper on cucullus broad, triangular with a thorn-shaped extension, pressed against the sacculus. Sacculus broader than in *tegyra*, extended and almost straight, apex with a sharp curved thorn. Saccus flat, without process. Aedeagus broad and short, vesica with at least four distinct lobes, the ventral lobe with a band of tiny teeth and with cornuti distally gradually getting larger to some massive hooked thorns. At the base of the vesica a large bowl-shaped cornutus with numerous small teeth and dorsally accompanied by a band of large teeth. Furthermore a large distal field of tiny teeth and dorsally a wide field of scattered tiny cone-shaped teeth. Female genitalia not examined.

Distribution: The holotype of *tricolora* was found on the Aru Islands (Indonesia), the holotype of *vulcanica* was found on Vulcan Island (Manam, Papua New Guinea). Both are females and actually the only females known. The presumed males of this species (assumed by the matching pattern of the forewing tornus) have been found on the mainland of New Guinea but are quite rare.

***Cyana (Clerckia) trigona* Rothschild, 1903** (Plate 128 figs 1-2, plate 135 figs 1-2, plate 140 figs 1-2)

= *Chionaema dinawa* Bethune-Baker, 1904 **syn. nov.** *Novitates zoologicae* 11 (2): 423; Draudt






(1914: 172); Strand (1922: 682), as *Chionaema dinawa*

Lectotype *trigona* [designated from syntype series of 2♂] ♂ BMNH: British New Guinea, Aroa R., (Weiske.), *Clerckia liboria trigona*, Type 1903, Nov.Zool. R. & J.
Lectotype *dinawa* [designated from syntype series of 2♂] ♂ BMNH: British New Guinea, Dinawa, 4,000 ft., viii.1902, Coll. A.E. Pratt, *Chionaema dinawa*, Type B-B.

References: *Clerckia fulvia trigona* Rothschild, 1903. *Novitates zoologicae* 10 (2): 312; Draudt (1914: 172); Rothschild (1915: 47); Strand (1922: 682), as *Chionaema fulvia trigona*.
Diagnosis: Forewings male 13.5-14.5 mm, female 15.5 mm. Head black with on the frons blue shimmering scales. Patagia and tegulae brown-red. Meso- and metathorax brown-red except for the distal part of the metathorax which is black with blue metallic scales. Abdomen black with blue iridescent scales, anal tuft in male dark grey. Legs black with blue iridescent scales. Forewing in male narrow and long, costa in male dorsally with a narrow pouch at two-third of wing length. Forewings brown-red with narrow black costa, at apex continued by a narrow black hindmargin and in tornus hardly broader than in hindmargin, gradually narrowing and running as a thin line along the entire dorsum to wingbase. The black colour with a slightly blue shimmer. Hindwing deep yellow with a broad black hind margin which is broader at the apex, at the dorsum broadly black and with a black streak in the basal area. Underside forewing with reduced yellow colour, in females less reduced. Female as male but without the pouch at the forewing costa and larger.
Male genitalia [gen.prep. RV1557]: Uncus long, finger shaped with a rounded apex. Tegumen broad. Valvae with a broad cucullus, gradually tapering distally and with a rounded apex. Clasper on cucullus triangular with a small blunt extension, pressed against the sacculus. Sacculus rather narrow, extended and curved with a sharp apex. Saccus flat, without process. Aedeagus broad and short, vesica with at least four distinct lobes, the long ventral lobe without cornuti. At the base of the vesica a bowl-shaped cornutus with numerous small teeth. A large lateral and distal field of tiny cone-shaped teeth, distally with larger cornuti which ends in a massive cornutus with some large teeth. Dorsally a field of clustered tiny teeth.
Female genitalia [gen.prep. RV1558]: The antrum sclerotized, flat, only the edges unsclerotized. caudally oblique. Cervix bursae with the caudal half sclerotized and wrinkled. Bursa with one large signum which is more or less rectangular with numerous tiny teeth. Appendix bursae large, about as large as the bursa itself, not sclerotized. Both, bursa and appendix, are broadly connected, almost forming one large bursa but divided by a sclerotized band.
Distribution: The species is widely distributed on New Guinea and prefers mountainous areas (750-1970 m). Locally a common species.

***Cyana (Clerckia) simonthomasi* sp. nov.** (Plate 128 figs 3-4, plate 135 figs 3-4)
Holotype ♂ RMNH: Ned. Nieuw Guinea, Kota Nica, Res. Hollandia, xi.1961, 100 m, host: Myrist., ex larva, leg. R.T. Simon Thomas.
Paratypes 3♂ RMNH: Ned. Nieuw Guinea, Achterland Hollandia, 20.x.1936, leg. W. Stüber, coll. J.M.A. van Groenendael; 1 ♀ RMNH, [Dutch New Guinea, nr Hollandia, ca. 1961], Ganjam kw[eek], ex larva, leg. R.T. Simon Thomas.

Derivatio nominis: The species is named in honour of Dr. Robert Terko Simon Thomas, former biological researcher in Hollandia (Dutch New Guinea) who bred the species in New Guinea without knowing that it concerned a new species. Before he died, on 5th June 2013, he was notified that this species would be named after him.
Diagnosis: Forewings male 12.5-13 mm, female 17 mm. Head and antennae brown, frons with greyish pale blue scales between the antennae. Patagia and tegulae orange-red. Meso- and metathorax black but mesothorax with a red distal rim. Abdomen black, anal tuft dark grey. Legs dark brown with at the outerside grey- blue scales. Forewing narrow and long, costa with a distinct pouch at two-third of wing length. Forewings orange-red at costal half, gradually fading into orange towards dorsum. Costa narrowly black, continued at termen with a narrow black hindmargin, in tornus slightly broader and along dorsum towards base gradually narrowing until halfway winglength. In contrary of the previous species the black colour without bluish shimmer. Hindwing yellow with a broad black hind margin which is broader at the apex, unique for this species is that the margin is fading in the tornus, leaving the dorsum yellow. Underside with the red coloration of upperside yellow and reduced. Female similar to male but larger and without the costal pouch.
Male genitalia [gen.prep. RV1550]: Uncus short with a spoon-shaped apex, broadly based. Tegumen gradually broadening towards uncus. Valvae with a broad cucullus which gradually tappers dis-






tally. Apex of cucullus rounded. Clasper on cucullus broad triangular with proximally a finger-shaped thorn, pressed against the sacculus. Sacculus rather broad, extended and distally curved upwards, apex with a sharp thorn. Saccus flat, without process. Aedeagus broad and short, vesica with at least four distinct lobes, the ventral lobe being the largest which carries a scobinated band with only few tiny chitinous drops, distally with larger cornuti with some very large clustered thorns. At the base of the vesica a stretched bowl-shaped cornutus with numerous smaller teeth and accompanied by a field of larger teeth. In the other two lobes a field of cone-shaped thorns, the ones in the distal field somewhat clustered. Female genitalia not studied because of missing of the abdomen in the only female specimen.

Additional information: The species has been reared by Dr. R.T. Simon Thomas for study at his laboratory in Hollandia, Dutch New Guinea. The foodplants were *Myristica* species, nutmeg. The cocoons which were spun by the caterpillars are of the typical *Cyana* type, with wide meshes of black and grey threads. The pupa is grey-brown with black stigmata.

Distribution: All specimens have been found in or nearby Hollandia (now Jayapura) in the north-east of Papua, Indonesia.

***Cyana (Clerckia) thoracica* Rothschild, Jordan, 1901** (Plate 128 figs 5-8, plate 129 figs 1-2, plate 135 figs 5-6, plate 140 figs 3-4)

= *Chionaema bicolor* Rothschild, 1913 **syn. nov.** *Novitates zoologicae* 20 (1): 192; Draudt (1914: 172); Hampson (1914: 635); Strand (1922: 678), as *Chionaema bicolour.*

= *Chionaema croceizona* Hampson, 1914 **syn. nov.** *Catalogue of the Lepidoptera Phalaenae. Supplement, volume 1. Catalogue of the Amatidae and Arctiadae (Nolinae and Lithosianae) in the collection of the British Museum*. London, British Museum: 626; Strand (1922: 679), as *Chionaema croceizona.*

Lectotype *thoracica* [designated from syntype series of 4♂] ♂ BMNH: [Dutch New Guinea], Humboldt Bay, ix-x.1892., W. Doherty, *Clerckia thoracica*, Type! 1901.
Holotype *bicolor* ♂ BMNH: German New Guinea, *Chionaema bicolor*, Type Rothsch.
Holotype *croceizona* ♀ BMNH: [Dutch] New Guinea, Wataikwa River, A.F.R. Wollaston., 1911-229., x.1910, *Chionaema croceizona*, type ♀. Hmpsn.

References: *Clerckia thoracica* Rothschild, Jordan, 1901. *Novitates zoologicae* 8 (4): 410); Rothschild & Jordan (1903: 482), as *Clerckia thoracica*; Draudt (1914: 172); Strand (1922: 692); Hampson (1914: 624); Gaede (1925: 243), as *Chionaema thoracica.*

Diagnosis: Forewings male 14-17 mm, female 20 mm. Head black with on the frons blue shimmering scales. Patagia black, in some specimens with an orange base. Tegulae orange, in some specimens with a black base. Pro- and mesothorax orange, metathorax black with blue hair-scales. Abdomen black with, anal segment orange-yellow. Legs dark grey-brown with blue shimmer.

The species is strongly sexual dimorphic in wing pattern which for a long time caused that both were considered to be different species. Previously no females were known from *thoracica* and no males were known from *croceizona*, until they were matched here. Forewing in male narrow and long, costa in male dorsally with a narrow pouch at two-third of wing length but this pouch is much less developed compared to other *Clerckia* species. Forewings yellow with the distal third orange-red. The black pattern on the forewing and hindwing is rather variable, in some specimens more extended or reduced than in others. Costa black, broadly continued along termen and ending in tornus. At apex the orange-red zone shortly intruded with black. Hindwing yellow with a broad black hind margin which is broader at the apex, at the dorsum broadly black but with yellow fringes at dorsum. Underside forewing at apex with extended black margin, hindwing identical to upperside. Female with broad forewing and with arched costa. Wing pattern of forewing usually black with an orange-yellow transverse band running from ¾ forewing length at costa to dorsum just next to the tornus. The black colour with a purplish shimmer. In one specimen from Landikma (Jayawijaya Mountains) in the basal half of the forewing also orange-yellow, except for the black costa basally (fig. 24), which most likely concerns a variation, the genitalia of this form are identical to those from the typical form. Hindwings black with a broad orange-yellow curved band which follows the narrow black hindmargin. The black colour with purplish shimmer, fringes with blue iridescence. Underside of both forms identical, similar to the upperside of the typical form but with broader orange band.

Male genitalia [gen.prep. RV1555]: Uncus finger shaped with a straight truncated apex. Tegumen broad. Valvae with a broad cucullus, gradually tapering distally and with a rounded apex. Clasper on cucullus with a ridge running from costa towards sacculus, arched and with setae on the rim, and






folded inwards. Sacculus broadly based, extended and curved with a sharp apex. Saccus "V"-shaped, with a shallow process. Aedeagus broad and short, slightly curved. Vesica with six lobes, the long and broad ventral lobe with a narrow scobinated band. At the base of the vesica a small bowl-shaped cornutus with numerous small teeth and a sclerotized ridge running distally. A broad scobinated band running from base of vesica running ventro-distally, ending in a cluster of needle-shaped cornuti. Dorsally from this cluster a larger bunch of needle-shaped cornuti and at the dorsal lobe a third but less dense cluster of needle-shaped cornuti.

Female genitalia [gen.prep. RV1548, RV1556]: The antrum sclerotized and flat. Cervix bursae unsclerotized and modestly sized. Bursa at the top with a strongly sclerotized folded plate. Half of the bursa copulatrix weakly sclerotized with strong wrinkles. Appendix bursae as a broad trunk-shaped extension latero-distally of the bursa. Two signa present, one smaller bowl-shaped signum with tiny teeth caudally and a longer boat-shaped signum, with even smaller teeth, laterally.

Distribution: It is a rather common species on New Guinea which prefers lowland and moderate altitudes. Most abundant in the western (Indonesian) part of New Guinea.

Subgenus *Cryptanaema* subgen. nov.

Type species: *Chionaema nigroplagata* Bethune-Baker, 1910

Cryptanaema subgen. nov. consists of species with a more complex or cryptic wing pattern which is dominantly with white, grey, black or brown patches, irregular lines or bands. The wings are relatively short and broad with in the males a distinct androconical pouch which either can run from wing base to ¾ of wing length or is positioned at two third from base of the costal rim. The subgenus occurs almost exclusively in New Guinea, one species in Australia. The structure of the male and female genitalia divide the species at least into four groups.

The *nigroplagata* group is the largest with until now seven recognized species. The wings are characterized by a complex of black or brown patches or bands on a white or cream coloured ground. Strong sexual dimorphism. The male genitalia are characterized with valvae which have the major part of the sacculus sclerotized with complex folds and rims. At the apex of the sacculus is a short finger-shaped process which form and size is diagnostic for the species. The aedeagus is short, the vesica with a long blade-shaped cornutus and two fields with thorn-shaped cornuti. The female genitalia are characterized by a large bursa copulatrix, the cervix bursae more or less broadly sclerotized with wrinkles and folds, and caudally with a characteristic large and clearly defined appendix bursae. Only one signum present with spines or thorns.

A closely allied group of species is the *fumea* group with three species. The wings are rather uniformly brown coloured with minor conspicuous pattern of dark patches or lines. Sexual dimorphism is less pronounced. The male genitalia have the valvae long and narrow with a narrow sclerotized sacculus which is extended with a long sharp process, the cucullus is for the major part unsclerotized. Aedeagus short and vesica with a blade-shaped cornutus and two fields of cornuti of which one field has only tiny spines or thorns, much smaller than in the *nigroplagata* group. The female genitalia with the bursa copulatrix globular, the distal part more regularly sclerotized (no wrinkles) and with a small and clearly divided appendix bursae or none. One signum with tiny thorns.

The *punctistrigosa* group consists until now of two species. The wing pattern is very diverse, cryptic like in the *nigroplagata* group. Strong sexual dimorphism. The valvae in the male genitalia are quite different from those in the previous two groups, the broad cucullus slightly sclerotized, with the sharp apex bent outwards. The vesica of the short aedeagus with a blade-shaped cornutus and one conspicuous field of large thorn-shaped cornuti. The female genitalia with a large bursa copulatrix, distally sclerotized and caudally with or without an inconspicuous appendix bursae. One small signum with tiny thorns.

The *brunnea* group is represented by only one species, in fact it is unclear if *Cyana brunnea* really belongs to the genus *Cyana*. The characteristic androconial pouch at the costa is what keeps this species in the genus. The wing colour and pattern is like that of the *fumea* group, rather uniformly dark brown with a yellowish white post medial transverse line. The male valvae are of a different structure than in the other groups, sacculus short and only slightly sclerotized, the clasper being the only conspicuous ornament. The cucullus is long and narrow, partly sclerotized with long setae at the costa. The vesica of the short aedeagus with one field of thorn-like cornuti. The female genitalia with a large globular bursa copulatrix and only sclerotized at the ostium and antrum. Caudally with a clearly separate appendix bursae. One signum with small thorns.

Cyana (*Cryptanaema*) *obscura* Hampson, 1900 is the only species of this group that occurs out-





side New Guinea, but its habitat Queensland has proven to have more sympatric distribution patterns with New Guinea. During the last Ice Ages the Torres Strait, which divides New Guinea from North Queensland, was dry and an opportunity for animals to migrate over land and to colonize new areas on both sides.

Checklist of *Cyana (Cryptanaema)*

***nigroplagata* group**
nigroplagata (Bethune-Baker, 1910)
= *Scaptesyle aroa* Bethune-Baker, 1904 **homonym nov.** (nec *Chionaema aroa* Bethune-Baker, 1904)
albimarginalis **sp. nov.**
basialba (Rothschild, 1913)
molbakon **sp. nov.**
inusitata (Bethune-Baker, 1910)
zwieri **sp. nov.**
melanoplagia (Hampson, 1900)
ssp. *melanoplagia* (Hampson, 1900)
ssp. *orcheia* (Rothschild, 1916)
ssp. *extrema* **ssp. nov.**
obscura (Hampson, 1900) [Queensland, Australia]

***fumea* group**
aroa (Bethune-Baker, 1904) (nec *Scaptesyle aroa* Bethune-Baker, 1904)
charybdis (Bethune-Baker, 1904)
= *nigrescens* (Rothschild, 1913) **syn. nov.**
fumea (Hampson, 1900)
= *melanochlorus* (Rothschild, 1916) **syn. nov.**

***punctistrigosa* group**
punctistrigosa (Rothschild, 1913)
gracilis **sp. nov.**

***brunnea* group**
brunnea (Bethune-Baker, 1904)

Descriptions of the New Guinea species

***Cyana (Cryptanaema) nigroplagata* (Bethune-Baker, 1910)** (Plate 129 figs 3-4, plate 135 figs 7-8, plate 140 figs 5-7)
= *Scaptesyle aroa* Bethune-Baker, 1904 **homonym nov.** (nec *Chionaema aroa* Bethune-Baker, 1904: 423) *Novitates zoologicae* 11 (2): 422; Draudt (1914: 181), as *Scaptesyle aroa*; Hampson (1914: 612), as *Caprimima aroa*; Strand (1922: 667), as *Damias aroa*.

Holotype *Scaptesyle aroa* ♀ BMNH: British New Guinea, Upper Aroa River, iii.1903, (Meek), *Scaptesyle aroa*, type.

Holotype *nigroplagata* ♂ BMNH: British Central New Guinea, Mount Kebea, 6,000 ft., iii-iv.1903, A.E. Pratt Coll., *Chionaema nigroplagata*, Type B-B.

References: *Chionaema nigroplagata* Bethune-Baker, 1910. *Annals and Magazine of Natural History* (8) 6: 442); Hampson (1914: 628); Strand (1922: 686), as *Chionaema nigroplagata*.
Diagnosis: Forewings male 12-13 mm, female 13-16.5 mm. Male with antennae brown, bipectinate. Head white, patagia bone-white but with lateral half brown with a purplish shimmer, like the base of the bone-white tegulae. Thorax white, in some specimens with a small black dorsal spot on the prothorax. Abdomen bone-white. Legs dark purplish-brown with bone-white rings. Forewing in male short and rather narrow, costa in male dorsally with a longitude narrow pouch running from base to ¾ of the winglength from where the costa is shallow angled and ends with a square angled apex. Forewings with the pouch purplish-brown crossed by three white bars which divide the costa in fact in four equal parts. Center of the forewing white, distally and along the pouch bone-white. A conspicuous black, more or less square patch in the post-median field with at the innerside three white dots in a row. In the median field a complex black marbled pattern. A row of marginal dots which run from the middle of the termen towards apex in increasing size. Hindwings white, in the basal area with bone-white hairs along the veins. Underside almost unicolorous white, except for the forewing costa with the pouch patterned black and white and with the pattern of the upperside shining through.
Female with antennae dark brown, thinner than in male. Head white, patagia brown with strong purplish shimmer. Tegulae white with a purplish-brown base. Thorax and abdomen bone-white. Legs bone-white with brown rings. Forewing in female of a usual form, rather broad. Forewings purplish-black with white dots and patches: at the base one small dot, in the basal field two larger patches, one subbasal patch at the dorsum, three patches in a row in the median field of which the dorsal two are usually confluent and near the costa on both sides accompanied by two spots (the basal two being the smallest), a row of small post-median spots and finally two large longitudinal marginal patches. Fringes white. Hindwings white with a broad dark grey margin, with white tipped apex, fringes white. Underside with the dark pattern fainted.
Male genitalia [gen.prep. RV1530]: Uncus long and finger shaped, hooked with a sharp apex. Tegumen broad and parallel sided. Valvae with cucul-






lus basally sclerotized, apical third only slightly sclerotized with rounded apex and with a comb of inwards curved strong setae. Clasper on cucullus rather complex with ridges, plates and folds: a distal ridge running obliquely from costa to the base of the apex of the saccular extension, a stronger sclerotized plate along the basal rim of the sacculus which is continued by an even stronger sclerotized spearhead-shaped plate which overlaps the base of the saccular extension. Sacculus large and broad, in the middle of the valvae gradually tapering in a short but solid extension with a sharp hooked apex. Saccus flat, without a process. Juxta rather simple, conversed "V"-shaped. Aedeagus broad and short, distally slightly tapering. Vesica globular, from base of vesica a long sclerotized narrow ridge running distally. Dorsally with a dense field of thorn-shaped cornuti and more ventrally with a larger field of more spread and larger thorn-shaped cornuti.

Female genitalia [gen.prep. RV1531]: Ostium rim, antrum and ductus bursae unsclerotized. Cervix bursae with a sclerotized folded and wrinkled plate which continues caudally with decreasing sclerotization. Bursa unsclerotized and characteristically triangle shaped. Caudally with a smaller globular appendix bursae. One small signum present: an irregular dentate plate with some tiny teeth on the surface.

Taxonomical note: The species is strongly sexual dimorphic in wing pattern which caused that both were at first considered to be different species. The male was described as *Chionaema nigroplagata* Bethune-Baker, 1910, the female as *Scaptesyle aroa* Bethune-Baker, 1904. In the same publication Bethune-Baker (1904) made the unfortunate decision to describe another species as *Chionaema aroa* which at that time was not yet a problem. However, *Scaptesyle aroa* (page 422) and *Chionaema aroa* (page 423) are in fact homonyms because they now appear to belong to the same genus, *Cyana*, in which the first mentioned would have page priority above the second. However, because of this confusion of equal names and the fact that there is no valid name for *Chionaema aroa* available, it seems wise to consider the name of the male, *nigroplagata* Bethune-Baker, 1910 to be the valid name of the species. *Chionaema aroa* Bethune-Baker, 1904 (page 423) is a different *Cyana* species and will stay valid, *Scaptesyle aroa* Bethune-Baker, 1904 (page 422), based on the female sex of *Chionaema nigroplagata*, enters therefore into secondary homonymy with *Chionaema aroa* and will be downgraded in favor of *Chionaema nigroplagata*.

Distribution: It is a very common species on the island of New Guinea which prefers mountain areas but is also found in the lowland.

***Cyana (Cryptanaema) albimarginalis* sp. nov.**
(Plate 129 fig. 5, plate 136 figs 1-2)

Holotype ♂ KSP: Indonesia, Papua, Puncak Jaya, Mokndoma, E 137°46.500' S 3°38,649', 2180 m, 15-23.i.2013, leg. Wild fam. & H. van Mastrigt, KSP65627.
Paratype 1 ♂ KSP: same as holotype.

Derivatio nominis: The name of the species refers to the broad white margin on the forewings.

Diagnosis: Forewings male 11 mm. Antennae brown, labial palpae black. Head, patagia, tegulae and thorax snowy white, patagia at base with a black spot. Legs pale yellow with black rings on the tarsi. Abdomen with basal half snowy white, distal half pale yellow with white anal tuft. Forewing rather short, costa in male dorsally with a longitude narrow pouch running from base to the subapical area. Pouch black and crossed by two white bars which divides the pouch in three equal parts. Major part of the forewing snowy white, including the broad hindmargin. A dark brown post-median band runs from costal pouch to dorsum and with a row of small white spots along the innerside which is indented in the wing fold. In the median field a thin black marbled pattern. A brown hairy scaling along the rim of the pouch. Hindwings snowy white, including the fringes. Underside with less pronounced black and brown pattern, the post-median band towards dorsum tapering. At the costa of the hindwing at the underside with a greyish-brown patch. Female unknown.

Male genitalia [gen.prep. KSP65627]: Uncus long and finger shaped, apex rather blunt. Tegumen broad, broader towards uncus. Valvae rather narrow, cucullus narrow and basally sclerotized, apical third only slightly sclerotized with rounded apex and with a comb of inwards curved small setae. Clasper pistol-shaped, strongly sclerotized, based on a distal oblique ridge which runs from costa to the end of the extension of the sacculus. A triangular folded sclerotized plate at the inside at the middle of the sacculus. Sacculus long, rather narrow and almost parallel sided, distally tapering towards a short solid extension with a blunt apex. Saccus arched, without a process. Juxta rather simple, conversed "V"-shaped. Aedeagus broad and short. Vesica globular with some small lobes. From base of vesica a long sclerotized ridge running distally, with both ends broader than in the middle. Dorsally with a small field of 7 rather large and 3 smaller thorn-shaped






cornuti and ventro-distally with two fields of cornuti: one with larger cone-shaped cornuti and one with very small chitinous drops.
Distribution: The only two specimens known have been found at about 2200 meters in the Sudirman Mountains (former Snow Mountains), Papua, Indonesia.

***Cyana (Cryptanaema) basialba* (Rothschild, 1913)** (Plate 129 figs 6-7, plate 136 figs 3-4, plate 140 figs 8-9)
Holotype ♀ BMNH: British New Guinea, Biagi, Mambare R., 5000 ft., ii.1906, (A.S. Meek), *Chionaema basialba*, Type Rothsch.

References: *Chionaema basialba* Rothschild, 1913. *Novitates zoologicae* 20 (1): 192; Draudt (1914: 173); Hampson (1914: 629); Strand (1922: 677), as *Chionaema basialba*.
Diagnosis: Forewings male 11.5 mm, female 12 mm. Male with antennae, head, patagia and tegulae, grey-brown. Thorax grey-white. Abdomen basally half snowy white, distal half bone-white. Legs grey with black rings on the tarsi. Forewing rather narrow, costa in male dorsally with a longitude narrow pouch running from base to the subapical area. Pouch dark grey with a narrow dark brown subbasal band running from costa to dorsum and a post-median brown-yellow band running from costa through the cell to the cubital vein. Major colour of the forewing brown, somewhat faintly marbled with white, the basal half of the dorsum white, in the middle at dorsum with a brown band crossing the white. In the apex a large conspicuous pale grey-brown patch and a smaller one in the tornus. Hindwings bone-white, including the fringes, at the apex and costa grey.
Female antennae, head, patagia and tegulae chocolate brown, the apex of the tegulae with white hairy scales. Thorax snowy white, in some specimens with a brown spot dorsally on metathorax. Abdomen grey, basally with some paler scales. Legs grey. Forewings broader than in male, chocolate brown. Basally with a large snowy white patch but the very wing base brown. A round snowy white apical patch and a longitudinal tornal patch, leaving the fringes brown. A snowy white costal patch in the middle and a white post-median spot which is a part of a usually faint or absent irregular post-median line. The brown colour in some specimens slightly marbled with white, especially at the dorsum. Hindwings unicolorous grey, somewhat paler at very wing base. Underside grey, forewing with a faint white apical patch and dorsum white.
Male genitalia [gen.prep. KSP24243]: Uncus long and finger shaped, apex rather blunt. Tegumen broad, almost parallel sided. Valvae rather broad, cucullus narrowly based and broadening distally. Basally sclerotized, apical third only slightly sclerotized with rounded apex and with one larger seta. Clasper long claw-shaped, strongly sclerotized, broadly based on a distal oblique ridge which runs from costa to the end of the extension of the sacculus. Sacculus broad with a triangular basal plate which overlaps the base of the cucullus. A short solid and hooked extension distally of the sacculus with a blunt apex. Saccus arched, without a process. Juxta rather simple, conversed "V"-shaped with a broad rim. Aedeagus broad and short, distal half narrowing. Vesica globular. From base of vesica a long sclerotized curved ridge running distally. Dorsally with a small field of 6 rather large and 2 smaller thorn-shaped cornuti and ventrally with two fields of cornuti: one with larger cone-shaped cornuti and one with very small chitinous drops.
Female genitalia [gen.prep. RV1534, KSP24244]: Ostium rim and antrum very slightly sclerotized, antrum flat and caudally oblique. Bursa copulatrix globular, cervix bursae with a band of sclerotized folded ribs connected to the bursa. Caudally with a rather large oval appendix bursae. One characteristically formed signum present in the caudal area, signum constricted at one side in the middle and covered with large thorns along the edges.
Distribution: The species is found in New Guinea at altitudes from 500 – 1850 meters. It is not very common.

***Cyana (Cryptanaema) molbakon* sp. nov.** (Plate 129 fig. 8, plate 141 figs 1-2)
Holotype ♀ RMNH: Ned. Nieuw Guinea, Sterrengebergte, Molbakon, 2-11.ix.1959, Sterrengebergte Exp.

Derivatio nominis: The species name "molbakon" refers to the village in the Star Mountains where the holotype was found.
Diagnosis: Forewings female 12 mm. Female with head, labial palpae, antennae, patagia, tegulae and thorax brown. Abdomen grey-brown. Legs yellow-brown with dark brown rings on the tarsi. Forewing dark brown with bluish pale grey pattern: a narrow basal line, a broad and oblique subbasal band running from dorsum to the cell, a conspicuous median fascia with a sharp angle in the cell and with a small dark brown discal spot, a narrow undulate submarginal line which follows the distal edge of the median band and finally a bluish pale






grey margin which is indented by small triangular teeth at the fringe line. Fringes grey-brown. Hindwing basally whitish but the distal half and costal area gradually suffused grey-brown. Fringes of hindwing pale grey. Underside forewing unicolorous brown except for the costal rim which is darker brown with two white spots. Underside hindwing as upperside. Male unknown.

Female genitalia [gen.prep. RV1567]: Ostium rim and antrum not sclerotized. Bursa copulatrix globular but wider than long, cervix bursae with a plate of about seven sclerotized ribs. At the right side caudally with a rather large globular appendix bursae. One characteristically formed signum present in the caudal area, like in *basialba* signum constricted at one side in the middle and covered with coarse thorns, especially along the edges, the signum more compact than in *basialba* of which the signum is wider.

Distribution: The species is only known by the female holotype and was found in the Star Mountains.

***Cyana (Cryptanaema) inusitata* (Bethune-Baker, 1910)** (Plate 130 figs 1-3, plate 136 figs 5-6, plate 141 figs 3-5)

Lectotype [designated from syntype series of 1♂ and 1♀] ♂ BMNH: Arfak Mountains, North New Guinea, 4,000 ft. Ii-iii. 1909, C.B. Pratt., *Chionaema inusitata*, Type ♂ B-B.

References: *Chionaema inusitata* Bethune-Baker, 1910. *Annals and Magazine of Natural History* (8) 6: 442; Hampson (1914: 628); Strand (1922: 684), as *Chionaema inusitata.*

Diagnosis: Forewings male 15 mm, female 13.5-15.5 mm. Male with antennae brown, palpae black, head yellow to bone-white, patagia pale yellow with a broad black rim with purplish shimmer, tegulae pale yellow with a large black patch with a blue shimmer. Thorax pale yellow with a large black dorsal patch. Abdomen basally with pale yellow hairy scales, distally abdomen grey, anal tuft yellow. Legs yellow with black bands and rings on the tibiae and tarsi with purplish shimmer. Costa of forewing in male strongly arched in the subapical area. A rather broad longitudinal pouch along the costa. Termen rounded. Pouch with three alternate bone-white and black bands of which the central black band is the broadest, the black colour with purplish shimmer. Pouch distally extended with a strongly scaled flap. Major colour of the forewing bone-white. Pattern brown with a copper glow: at dorsum a median irregular patch and an irregular edged submarginal band which is broadest in the middle and a row of black terminal dots, fringes grey. Hindwings bone-white with the base pale yellow. A broad grey marginal band, including the fringes. Underside of fore- and hindwings in male almost identical to upperside but with the dark pattern somewhat reduced and less pronounced.

Female antennae and palpae black, head yellow, patagia entirely black with strong purplish shimmer, tegulae with basal half black with purplish shimmer, distal half yellow. Thorax yellow with a large black dorsal patch with a blue glow. Abdomen basally with yellow hairy scales, distally abdomen grey, the inter-segmental rims and distal segment yellow. Legs yellow with bands and rings of black and blue shimmer on the tibiae and tarsi. Forewings rather long but robust. Main colour of forewing in female is brown to very dark brown with a copper glow. Specimens can be quite variable in pattern, in some specimens only a basal white patch and a small longitudinal apical dot is present, but usually the dark forewings have a large white basal patch, leaving the very wing base brown, a slightly oblique white median band of three more or less confluent patches which runs from costa to dorsum. In this band a small black discal spot is present or confluent with the outer edge of the band. Usually one or a few small white subbasal spots and a faintly visible irregular post-median line, but in dark specimens these are absent. A longitudinal apical spot which is almost always present, even in dark specimens. In the tornal area in pale patterned specimens some white marbling present. Fringes black. Dark specimens can always be identified by the strong copper glow of the forewings and the characteristic yellow head. Hindwings unicolorous grey but paler at the very wing base. Underside with strong reduced white pattern but the apical spot always clearly visible.

Male genitalia [gen.prep. RV1538]: Uncus long, slender and hooked with a sharp apex. Tegumen broad, parallel sided. Valvae broad, cucullus in the center not sclerotized, apical third hardly sclerotized with a slightly falcate apex and with a row of strong setae on the apical rim. Clasper large, triangular and flat with a sharp thorned apex and pressed against the sacculus extension. Sacculus strong and broad with a finger-shaped process in the middle which overlaps the unsclerotized center of the cucullus. A solid extension distally of the sacculus with a sharp hooked thorn at the apex. Saccus flat, without a process. Juxta conversed "V"-shaped with a narrow sclerotized rim. Aedeagus broad and very short, distally broadly incised. Vesica globular with





two distinct lobes. The dorsal lobe scobinated with very tiny chitinous drops which continues distally and runs in a band to the ventral lobe. In this large ventral lobe some characteristic cornuti are found: one large bar-shaped cornutus with both ends opposite hooked. Distally a field of large thorn-shaped cornuti which are getting smaller ventrally, and laterally a field of even larger thorn-shaped cornuti with some smaller thorns aside.

Female genitalia [gen.prep. RV1535, RV1539, RV1540, RV1541]: Ostium rim and antrum not sclerotized and with a rather long ductus bursae. Bursa copulatrix more or less triangular, cervix bursae with a plate of strongly sclerotized wrinkled folds. Caudally with a rather large globular appendix bursae. One small bowl-shaped signum present in the caudal area, heavily thorned at the edges and with some dentated projections.

Distribution: Widely distributed in Indonesian New Guinea and Waigeo Island, in Papua New Guinea it seems restricted to the western area near the border. Locally a common species. Found in lowland and mountain areas.

***Cyana (Cryptanaema) zwieri* sp. nov.** (Plate 130 figs 4-6, plate 136 figs 7-8, plate 141 figs 6-8)

Holotype ♂ RMNH: Indonesia, Papua, Kecamatan Nipsan, Walmak, 1710 m, 4°07'S - 138°36'E, 31.i-09.ii.2005, at light, cultivated area, UNCEN-ZMA Expedition, Papua Indonesia 2005.

Paratypes 2♂ & 4♀ RMNH: same as holotype.

Derivatio nominis: The species is named in honour of J.H.H. Zwier (Zelhem, The Netherlands) who was a member of the 2005 expedition to Walmak where the types of this species were collected.

Diagnosis: Forewings male 12-13 mm, female 13-15 mm. Males with antennae brown, labial palpae dark brown. Head dark brown with a purplish gloss. Patagia and tegulae usually dark brown with a purplish gloss but in pale specimens bone-white with some diffuse shining brown-purple scaling. Thorax bone-white with scarce brown scales. Legs buff coloured without pattern. Abdomen bone-white, basally with buff coloured hairy scales, anal tuft buff. Forewing short and broad, at ¾ of wing length the costa is nodded by the distal flap of the narrow rectangular pouch. Pouch dark brown, marbled with some white and with the distal flap buff coloured. A dark brown-purplish hairy scaling along the rim of the pouch. Dorsum of forewing bone-white, in the middle with some black marble pattern, the area between dorsum and costa reddish brown, in pale specimens only traces of this. An irregular and incomplete subbasal line running from dorsum to the cubital vein, at dorsum pronounced. A broad dark brown undulate post-median line runs from 2/3 of dorsum length to the distal flap of the pouch, in the middle sinuous. Marginal third of the wing dark brown, at termen more greyish. Hindwings bone-white, with a broad dark grey margin and costa, including the fringes. Underside unicolorous grey-brown, except for the bone-white dorsum. Hindwing as upperside but less pronounced.

Female with antennae, labial palpae, head and patagia brown with a reddish copper gloss. Tegulae of the same colour but with some white hairy scales. Thorax white with caudally more or less extended brown scaling. Legs unicolorous grey-brown. Abdomen grey-buff. The females are variable in the white pattern on the brown forewings being more or less extended. In pale specimens there is a conspicuous white zigzagging median band with a small discal brown spot. A large white basal patch but with the very wingbase dark brown. Subbasally there is a faint white patch. A faint undulate white post-median line which is curved in the cell along the large tooth of the median band. A buff coloured apical patch, in some specimens continued by a faint undulate marginal line. Fringes grey. Dark specimens resemble those of *inusitata* and *basialba* very much but there are differences. They always have the white basal patch, a remnant of the median band as a conspicuous white spot at the costa and an undulate line at the dorsum, and the buff coloured apical spot with undulate marginal line (not so in *basialba* and the head is dark brown in *zwieri* and bone-white in *inusitata*). Hindwings grey with the very wingbase whitish. Underside unicolorous grey but the costal spot still visible.

Male genitalia [gen.prep. RV1532]: Uncus long, slender and hooked with a sharp apex. Tegumen broad with parallel sides. Valvae rather narrow, cucullus in the center slightly sclerotized and with a broad heavy sclerotized curved rim at the base of the valva and running towards the clasper, apical third of cucullus slightly sclerotized with rounded apex and with a comb of curved setae. Clasper obliquely triangular, flat and stretched and with a sharp apex, strongly sclerotized, based on a distal oblique ridge which runs from costa to the end of the extension of the sacculus. Sacculus broad, from base distally tapering towards a solid curved extension with a blunt apex. Saccus arched, without a process. Juxta conversed "V"-shaped, rim rather narrow. Aedeagus broad and rather short, slightly sinuous. Vesica globular with some lobes. Dorsal lobe scobinated with numerous tiny chitin-






ous drops. Laterally a long straight bar-shaped cornutus which runs from base of vesica to the ventral lobe which has a field of large cone-shaped cornuti, at the edges accompanied by smaller cornuti.
Female genitalia [gen.prep. RV1533]: Ostium rim and antrum not sclerotized, ductus bursae funnel-shaped. Cervix bursae with a strongly sclerotized folded plate of about six ribs. Bursa copulatrix globular with one small signum at the bottom caudally. Signum constricted at one side but not deeply, covered entirely with coarse thorns and with one short projection. Appendix bursae broadly connected at the right side of the bursa copulatrix, shoe-shaped.
Distribution: The species has only been found in Walmak in the Jayawijaya Mountains, Papua, Indonesia, at an altitude of 1700 meters.

***Cyana (Cryptanaema) melanoplagia* (Hampson, 1900)**

ssp. ***melanoplagia* (Hampson, 1900)** (Plate 130 figs 7-8, plate 137 figs 1-2, plate 141 figs 9-10)
Holotype *melanoplagia* ♂ BMNH: Kapaur, S.W NGuinea, xii.1896-i.1897, Doherty, 97-165, *melanoplagia*, type ♂ Hmpsn.

References: *Chionaema melanoplagia* Hampson, 1900. *Catalogue Lepidoptera Phalaenae 2. Catalogue of the Arctiadae (Nolinae, Lithosianae) in the collection of the British Museum*. London, British Museum: 318; Draudt (1914: 173); Strand (1922: 685), as *Chionaema melanoplagia.*

ssp. ***orcheia* (Rothschild, 1916) stat. nov.** (Plate 131 figs 1-2, plate 137 figs 3-4, plate 142 figs 1-2)
Lectotype *orcheia* [designated from syntype series of 4♂ and 4♀] ♂ BMNH: Dampier Isl., ii-iii.1914, (Meek's Expedition), *Chionaema orcheia*, type Rothsch. Specimen [with round type label, paralectotypes without such label].

References: *Chionaema orcheia* Rothschild, 1916. *Novitates zoologicae* 23 (3): 327; Strand (1922: 686), as *Chionaema orcheia.*

ssp. ***extrema* ssp. nov.** (Plate 131 figs 3-4, plate 137 figs 5-6, plate 142 figs 3-4)
Holotype ♂ BMNH: Goodenough Isl., 2500-4000 ft., iv.1913, A.S. Meek.
Paratypes 4♂ & 10♀ BMNH: Goodenough Isl., 2500-4000 ft., iii.1913 [4 ♂♂, 5 ♀♀], iv.1913 [5 ♀♀], A.S. Meek.

Diagnosis ssp. ***melanoplagia*:** Forewings male 11.5-12 mm, female 12-13.5 mm. Males with antennae brown, labial palpae dark brown. Head dark brown but behind the antennae pale buff. Patagia and tegulae pale buff. Thorax and base of abdomen bone-white, distally abdomen dark grey with anal tuft buff. Legs brown with narrow white rings on the tarsi. Forewing short and broad, at ¾ of wing length the costa is bluntly angled from the distal flap of the narrow rectangular pouch, to the blunt apex. Termen round. Pouch bone-white with in the center a distinct dark brown costal patch, along the basal part of the costa usually somewhat suffused with brown scales. Forewing dominantly bone-white with buff apex and brown pattern with a purplish gloss. Below the costal pouch in the center of the wing a broad field of brownish narrow hairy scales which easily come off. This is best seen in fresh specimens. In fresh specimens a short straight brown line from the center of dorsum to the cubital vein. Post-median line bone-white which runs from dorsum to costa with the dorsal half dentate, at the innerside bordered with brown and distally bordered by a conspicuous longitudinal brown patch which runs from tornus to the subapical area. Fringe line checkered brown. Hindwings bone-white, with a broad dark grey margin, including the fringes. Underside unicolorous grey-brown, except for the bone-white dorsum. Hindwing as upperside but less pronounced.
Female with antennae, labial palpae, head and patagia dark brown. Tegulae white, at base dark brown. Thorax white. Legs grey-brown with narrow white rings on the tarsi. Abdomen basally whitish, distally abdomen dark grey. There is some variation in the dark brown pattern being more or less extended. In extended patterned specimens the dominantly white forewings have a large median costal patch which is trapezium-shaped. Below this costal patch an almost straight narrow line runs to the dorsum and a short thin median line runs from dorsum to the wing fold. A large subapical costal patch which is crossed by the undulate and sinuous white post-median line which runs to the subtornal area and is dentate in the dorsal half. This dentate part at the innerside bordered with a fine brown line, distally bordered by a longitudinal tornal patch which runs to the subapical area. A row of small brown dots along the termen, fringes grey. Pale specimens lack the median lines and have reduced brown triangular patches along the costa and tornus. Hindwings grey with the very wingbase whitish. Underside of forewings grey with two narrow stripes along the costa, hindwings as upperside.





Diagnosis ssp. ***orcheia*:** Forewings male 11.5 mm, female 13 mm. Males in general as *melanoplagia* s.str. but with the bone-white colour replaced by buff. Dark brown pattern extended. Prothorax dark brown, the tornal patch larger and confluent with the dentate post-median line, a median patch at dorsum from which two more or less straight lines run to the costal patch. Hindwings as in the typical race.

Female with the white colour replaced by pale buff. The brown pattern much extended. Median costal patch dark brown and a dark brown discal spot present. Grey-brown tornal patch is connected with the subapical patch forming a broad submarginal band. Two straight median lines run from costal patch to dorsum. Hindwings as in the typical race.

Derivatio nominis ***extrema* ssp. nov.**: The name *extrema* refers to both, the extreme diffusion of the colour and the extreme far east distribution of this subspecies, on Goodenough Island.

Diagnosis ssp. ***extrema* ssp. nov.**: Forewings male 13 mm, female 14 mm. Male with the wing pattern as in the typical race but the ground colour of the forewing darkened to grey-brown. Hindwing with narrower grey hindmargin. Head and thorax unicolorous brown, base of abdomen with dark buff coloured hairy scales, distal part dark grey with a buff anal tuft.

Female with the ground colour unicolorous darkened to grey-brown, the dark brown pattern as in the typical race but with a small discal spot present. Hindwings grey with the very wing base whitish. Basal part of abdomen buff-grey, distal part dark grey.

Male genitalia [gen.prep. RV1512 (*melanoplagia*), RV1514, RV1518 (*orcheia*), RV1516 (*extrema*)]: Uncus long, slender and hooked with a sharp apex. Tegumen broad with parallel sides. Valvae distally gradually broadening, cucullus in the center slightly sclerotized, with a narrow rim running from costa towards the end of the extension of the sacculus. Apical third of cucullus slightly sclerotized with rounded apex and with a comb of curved setae. Clasper broad triangular, flat and with a sharp apex. Sacculus broad, distally tapering towards an extension with a small thorn. Saccus arched, without a process. Juxta conversed "U"-shaped, rim very broad. Aedeagus broad and rather short, distally slightly narrowing. Vesica globular with some lobes. Dorsal lobe with a field of tiny chitinous drops accompanied by a few larger thorn-shaped cornuti. Laterally a long sickle-shaped cornutus which runs from base of vesica to the ventral lobe which has a field of cone-shaped cornuti, ventrally accompanied by smaller cornuti and chitinous drops.

Female genitalia [gen.prep. RV1513 (*melanoplagia*), RV1515, RV1519 (*orcheia*), RV1517 (*extrema*)]: Ostium rim and antrum not sclerotized, ductus bursae long and funnel-shaped. Cervix bursae with a slightly sclerotized folded plate with long ribs. Bursa copulatrix flattened globular with one small signum at the bottom caudally. Signum at one side constricted but not deep, covered with tiny thorns, along the edges with larger thorns. A large oval appendix bursae with a narrow connection at the right side of the bursa copulatrix.

Distribution: The species is confined to New Guinea and some adjacent islands. The nominotypical subspecies occurs on the mainland of New Guinea and the islands Waigeo and Japen at altitudes from sea level to 1500 meters and is most found in the Indonesian part of New Guinea. Subspecies *orcheia* is found on Karkar (formerly Dampier Island), Papua New Guinea and subspecies *extrema* ssp. nov. is found on Goodenough Island, D'Entrecasteaux Islands, Papua New Guinea.

***Cyana (Cryptanaema) aroa* (Bethune-Baker, 1904)** (Plate 131 figs 5-6, plate 137 figs 7-8, plate 142 figs 5-6)

Holotype ♂ BMNH: British New Guinea, Upper Aroa River, iv.1903, (Meek), *Chionaema aroa*. Type, B-B. 1904.

References: *Chionaema aroa* Bethune-Baker, 1904 (nec *Scaptesyle aroa* Bethune-Baker, 1904). *Novitates zoologicae* 11 (2): 423; Draudt (1914: 173); Hampson (1914: 629); Strand (1922: 677), as *Chionaema aroa.*

Diagnosis: Forewings male 12 mm, female 14 mm. Male with antennae brown, palpae, head, patagia, tegulae and thorax dark brown. Legs and abdomen grey-brown. Rather broad longitudinal costal pouch strongly hairy scaled in the same colour of the forewing. Distal part of the pouch runs over the costal rim at two-third from wingbase. Forewing almost unicolorous dark brown with only a faint black post-median transverse band visible. Hindwings entirely grey-brown. Underside of fore- and hindwings in male unicolorous brown.

Female antennae brown, palpae, head, patagia, tegulae and thorax chocolate brown with some metallic shimmer. Legs and abdomen grey-brown. Forewings broad. Main colour of forewing in female is chocolate brown with a metallic shine. A faint pattern of some transverse bands formed by sprinkled blue-greyish scales, a post-median undulated line runs from costa to dorsum. In some specimens a distinct discal black spot is visible. Apical area






of the forewing usually greyish brown. Hindwings unicolorous grey-brown. Underside of fore- and hindwings in female unicolorous brown.

Male genitalia [gen.prep. RV1520]: Uncus long and slender. Tegumen broad, parallel sided. Valvae narrow and elongated, cucullus with only the costa completely sclerotized, the distal half of cucullus not sclerotized and with a narrow rounded apex. Long setae present on the apex. Sacculus broadly based and gradually narrowing to a strong and curved extension with a hooked apex. Clasper rather small and narrow, like a spearhead-shaped ridge at the base of the sacculus extension. Saccus flat, without a process. Aedeagus broad and very short. Vesica globular with three distinct lobes. The largest dorsal lobe with rather large coarse blunt thorns which decrease in size and spread distally and scobinated with tiny chitinous drops which continues distally and run to the distal lobe, in which again some blunt thorns are present. The basal ventral lobe only with some spread scobination of tiny chitine drops but connected to a band of heavy scobination at the distal part of the aedeagus.

Female genitalia [gen.prep. RV1521]: Ostium rim and antrum not sclerotized and with a rather broad ductus bursae. Bursa copulatrix oval shaped, cervix bursae partly sclerotized with a plate of strongly wrinkled folds. A small globular appendix bursae. Caudally, at the bottom of the bursa copulatrix, a small helmet-shaped arched signum present, with heavily thorned surface and edges.

Distribution: Not a common species. Locally found from eastern Papua, Indonesia, to Central Papua New Guinea from low land up to 1900 meters.

***Cyana (Cryptanaema) charybdis* (Bethune-Baker, 1904)** (Plate 131 figs 7-8, plate 138 figs 1-2, plate 142 figs 7-9)

= *Chionaema nigrescens* Rothschild, 1913 **syn. nov.** *Novitates zoologicae* 20 (1): 193; Draudt (1914: 173); Hampson (1914: 630); Strand (1922: 686): *Chionaema nigrescens.*

Lectotype *charybdis* [designated from syntype series of 1♂ and 1♀] ♂ BMNH: British New Guinea, Dinawa, 4,000 ft., ix.1902, Coll. A.E. Pratt, *Chionaema charybdis*. Lectotype *nigrescens* [designated from syntype series of 1♂ and 1♀] ♂ BMNH: British New Guinea, Biagi, Mambare River, 5000 ft., iii.1906, (A.S. Meek), *Chionaema nigrescens*, Type Rothsch.

References: *Chionaema charybdis* Bethune-Baker, 1904. *Novitates zoologicae* 11 (2): 423; Draudt (1914: 172); Hampson (1914: 630), as *Chionaema charybdis*; Strand (1922: 682), as *Chionaema fumea charybdis.*

Diagnosis: Forewings male 15 mm, female 20 mm. Male with antennae brown, palpae, head, patagia, tegulae and thorax dark brown. Legs and abdomen grey. Pouch strongly hairy scaled in the same colour of the forewing. Distal part of the pouch runs over the costal rim at two-third from wingbase. Forewing dark brown with some transverse lines. The undulate subbasal line and zigzagging post-median line sharply defined, the median line faintly visible. Hindwings grey-brown with a grey faint discal spot. Underside of fore- and hindwings in male unicolorous brown with a discal spot in the hindwing.

Female antennae brown, palpae, head, patagia, tegulae and thorax like in male brown. Legs and abdomen grey. Forewings broad, dark brown. A pattern of zigzagging black transverse lines, especially the post-median and submarginal line. Two black spots present in the cell, the discal spot and one more basally. Hindwings unicolorous grey-brown with a faint grey discal spot. Underside of fore- and hindwings in female unicolorous brown with a discal spot in the hindwings.

Male genitalia [gen.prep. RV1524]: Uncus long and slender, apex sharp and slightly hooked. Tegumen broad, with diverging sides. Valvae elongated, cucullus spoon-shaped, the basal half sclerotized, the distal half of cucullus not sclerotized and with a broad rounded apex. Sacculus narrow based, elongated with an extension which is apically curved into a broad sharply hooked apex. Clasper very small, integrated in the middle of the long sacculus as a hooked flap pressed against the surface. Saccus shallow, without a clear process. Aedeagus broad and short, distally slightly tapering and with a scobulated ring. Vesica globular with two distinct lobes. Ventrally (in picture on top) with a straight bar which has a keel in the middle. A central band with large elongated cornuti, the basal cornuti being the largest and some even confluent. The dorsal lobe (in picture on bottom) with tiny chitinous drops.

Female genitalia [gen.prep. RV1525]: Ostium rim and antrum heavily sclerotized, wide funnel-shaped continued in a bowl-shaped connection to a short and rather broad ductus bursae. Cervix bursae large and swollen with some chitinous folds, for the greater part covered with tiny chitinous needles. Bursa copulatrix oval shaped, broadly connected with the cervix bursae. A small globular appendix bursae caudally at the bottom of the bursa copula-









trix. At the right flank a small bowl-shaped signum present, with thorned surface and edges.
Distribution: Widely distributed in New Guinea at higher altitudes, from 1200 up to 2000 meters.

***Cyana (Cryptanaema) fumea* (Hampson, 1900)**
(Plate 132 figs 1-2, plate 138 figs 3-4, plate 143 figs 1-3)
= *Chionaema melanochlorus* Rothschild, 1916 **syn. nov.** *Novitates zoologicae* 23 (3): 328; Strand (1922: 685), as *Chionaema melanochlorus*.

Holotype *fumea* ♂ BMNH: Kapaur, S.W New Guinea, Dec. 96-Jan. 97., Doherty., 97-165, *Chionaema fumea*, type ♂ Hmpsn.
Lectotype *melanochlorus* [designated from syntype series of 1♂ and 1♀] ♂ BMNH: Dampier Isl., ii-iii.1914, (Meek's Expedition), *Chionaema melanochloros*, Type, Rothsch.

References: *Chionaema fumea* Hampson, 1900. *Catalogue Lepidoptera Phalaenae 2. Catalogue of the Arctiadae (Nolinae, Lithosianae) in the collection of the British Museum*. London, British Museum: 317; Draudt (1914: 173); Strand (1922: 682), as *Chionaema fumea*; Holloway (2001: 331), as *Cyana fumea*.
Diagnosis: Forewings male 10.5 mm, female 12 mm. Male with antennae brown, palpae, head, patagia, tegulae and thorax grey-brown. Legs and abdomen grey, the basal part of abdomen paler grey, with an ochreous anal tuft. Pouch along the forewing costa narrow with only short scales. Forewing grey-brown with some faint darker and paler transverse bands. Most conspicuous is the somewhat paler central area which also crosses the pouch and a dark brown triangular costal patch which is connected to the black discal spot. In f. *melanochlorus* the transverse bands are more contrasted with an undulate paler post-median line and pale submarginal band. Hindwings white with the margins suffused with grey-brown, especially at the costa and apical area. Underside of forewings grey-brown, hindwings as upperside but with a discal spot.
Female with head, thorax and abdomen as in male. Forewings broad, grey-brown. Dark pattern concentrated in the middle area but very diffuse. Two black spots present in the cell, the discal spot and one more basally. Hindwings white with a broad grey-brown area along the costa and apex and with a faint grey discal spot. Underside with forewings grey-brown, hindwings as upperside but with a discal spot.
Male genitalia [gen.prep. RV1536]: Uncus long and slender, apex sharp and slightly hooked. Tegumen broad, with diverging sides. Valvae long, the basal half of cucullus sclerotized, the distal half of cucullus not sclerotized but at the costal area slightly sclerotized. Apex of cucullus extended, finger-shaped and connected with soft tissue at the extension of the sacculus. Sacculus basally broadly fused with the cucullus and gradually narrowing and elongated with an extension which is slightly curved. At the apex a small thorn. Clasper small, a thin hook which is pressed against the surface. Saccus flat, without process. Aedeagus rather long and curved, distally with some thorns at the incised rim. Vesica globular with two distinct lobes. Ventrally with a straight bar with both ends sharp. Ventral lobe furthermore with a field of small sharp cornutal thorns. A central band with about ten large sharp cornuti, the more distally on the vesica, the more blunt the cornutus. The dorsal lobe with tiny chitinous drops.
Female genitalia [gen.prep. RV1537]: Ostium rim and antrum heavily sclerotized, wide funnel-shaped, antrum short, followed by a rather broad ductus bursae. Cervix bursae consists of two parts, a smaller wrinkled part which is hardly sclerotized, and a large and swollen part with folds and wrinkles which is for the greater part sclerotized. Bursa copulatrix globular, broadly connected with the cervix bursae. A small globular appendix bursae caudally attached to the right side of the cervix bursae. At the right side of the bursa copulatrix a small irregular shaped signum present compiled of clustered blunt thorns.
Distribution: A common species in New Guinea from lowland areas up to 900 meters. It is also found on Dampier Island (Papua New Guinea) where the few known specimens have a more contrasted pattern and were described as *melanochlorus* by Rothschild (1916), but the species is rather variable in pattern all over New Guinea and there is no reason to even consider *melanochlorus* to be of subspecies level.

***Cyana (Cryptanaema) punctistrigosa* (Rothschild, 1913)** (Plate 132 figs 3-4, plate 138 figs 5-6, plate 143 figs 4-5)

Holotype ♂ BMNH: Mt. Goliath, 5000 ft., Centr. Dutch N.Guinea, about 139. long., iii.1911, (A.S. Meek), *Chionaema punctistrigosa*, Type Rothsch.

References: *Chionaema punctistrigosa* Rothschild, 1913. *Novitates zoologicae* 20 (1): 225; Draudt (1914: 174); Hampson (1914: 627); Strand






(1922: 689), as *Chionaema punctistrigosa*.

Diagnosis: Forewings male 12-13 mm, female 14.5 mm. Male with palpae black, apical segment pale buff. Head, antennae, thorax and legs pale buff. Thorax with two black spots caudally and tegulae with a black spot at base, all these black spots with a purple metallic shimmer. Abdomen basally pale yellow, in the middle brown and with a pale yellow anal tuft. Pouch along the forewing costa narrow with only short scales. Forewing pale buff with black pattern with purple shimmer. Pattern of dots and broken bands: a distinct black basal spot, a conspicuous black subbasal costal patch continued by some small subbasal spots towards dorsum, a median dorsal black bar running from dorsum to the cubital vein, a small black discal spot and one just below the pouch, the black post-median line undulated and with teeth but incomplete, apical area suffused with black but leaving a buff subapical costal patch. Hindwings pale yellow with a grey-brown hindmargin, at the apex broader. Underside of forewings buff but the pouch black, hindwings as upperside but hindmargin faint.

Female with head, thorax and abdomen as in male but head with on the vertex a black spot with purple shimmer and spots on the thorax larger. Legs buff with grey suffusion. Forewings broad, pale buff with a pinkish tinge. Black pattern more contrasted than in male, all with purple shimmer: the median band almost completely running from dorsum to costa but in the discal area thin and in some specimens broken and with a tiny spot basal of it, the post-median line consists of a sinuous row of black teeth, a distinct round discal spot and a smaller spot on the cubital vein more basally, the marginal area almost entirely black except for the buff subapical costal patch and a buff patch above the tornus. Hindwings pale yellow with a broad brown hindmargin and a faint discal stripe. Underside with forewings brown with the pattern accentuated, hindwings as upperside but with pattern more accentuated.

Male genitalia [gen.prep. RV1527]: Uncus long and slender, blunt apex. Tegumen broad, with diverging sides. Valvae with cucullus flat and slightly sclerotized, the costa more sclerotized, at apex ventrally falcate with a sharp hook. Sacculus rather narrow with a short extension, apex of extension with a small blunt tooth pointing inwards. Clasper triangular with a sharp hooked apex, flat and pressed against the sacculus. Saccus flat, without process. Aedeagus short and broad, distally narrowing and with four thorns on a strongly sclerotized rotary saw-shaped apex. Vesica globular with some indistinct lobes. Ventrally with a sclerotized curved plate and a scobinated field of chitinous drops. Distally with a few rows of large shark teeth-shaped cornuti in a field of tiny chitinous drops.

Female genitalia [gen.prep. RV1526]: Ostium rim and antrum not sclerotized, ductus bursae short and rather narrow. Transition of cervix bursae and bursa copulatrix unclear, widely connected. Cervix bursae with some sclerotized wrinkles and with surface entirely covered with tiny chitinous needles which continues half way the bursa copulatrix. A small globular appendix bursae attached with a long ductus distally, on top of the cervix bursae. At the right side of the bursa copulatrix a small bowl shaped signum present with sharp thorns of which some larger.

Distribution: Locally a common species in New Guinea, also known from Japen Island. Found at altitudes from 150 to 1500 meters.

***Cyana (Cryptanaema) gracilis* sp. nov.** (Plate 132 figs 5-6, plate 138 figs 7-8, plate 143 figs 6-7)

Holotype ♂ KSP: Indonesia, Papua, Kab. Sarmi, Mamberamo Basin, Peg. Foja, 2°34.5' S - 138°42.9' E, 1650 m, 23.xi-7.xii.2005, Henk van Mastrigt/CI-RAP, KSP42271.

Paratypes 2♀ KSP: same as holotype, KSP42283& KSP42284.

Derivatio nominis: The species is named *gracilis* to emphasize the delicate pattern of fine stripes and lines in the male and female of this species.

Diagnosis: Forewings male 13 mm, female 15-16 mm. The species is strongly sexually dimorphic. Male (holotype) with palpae brown. Head, thorax and abdomen bone-white, antennae buff. Thorax with a dorsal black central stripe. Pouch along the forewing costa narrow with only short scales. Forewing narrow, marbled with black, grey and brown into a complex pattern of patches and lines. At the dorsum a pale buff area with two longitudinal brown lines, the central area below the cubital vein bluish grey. Basal half of costal area dark brown and the distal half of the costal area pale buff, apical area darker buff. In the pale buff area a black discal spot is present, more basal a larger black spot at the border of the dark and pale areas. A fine brown sinuous median line crosses the wing from costa to dorsum just basad from the discal spot. In the marginal field the veins are black with a white spot each in the rim of the margin. Fringes grey. Hindwings bone-white with snow-white fringes.

Female with palpae brown. Head bone-white, patagia buff, tegulae and thorax chocolate brown with some bluish grey scales on the metathorax. Abdo-





men bone-white. Forewing rather narrow, main colour bluish grey and white. Costal half of basal area chocolate brown, at dorsum sprinkled with bluish grey. A broad bluish grey subbasal line, bordered by a thin grey line which ends at the costa in a chocolate brown triangular spot. Median and post-median area greyish white, with a faint grey discal spot and with a grey sinuous median line running from dorsum to costa where it ends in a second chocolate brown triangular spot, the post-median field bordered by a grey line which ends at the costa in a third chocolate brown triangular spot. The three costal spots lay in a snow-white costal area which continues in the submarginal field. A stretched triangular chocolate brown tornal patch which continues in an incomplete submarginal line consisting of a few remaining spots. Marginal field bone-white, marginal line grey with some faint checkering spots in the bone-white fringes. Hindwings bone-white with a narrow grey marginal line. Fringes snow-white.

Male genitalia [gen.prep. KSP42271]: Uncus straight, long and slender, apex with a small thorn. Tegumen broad, with diverging sides. Valvae with cucullus flat and at costal half sclerotized, apex ventrally curved with a sharp hook, apical rim irregular by pustulations of setae. Sacculus broadly based and with a folded rim which runs into a short extension with a sharp apex. Clasper narrow and stretched triangular with a blunt apex, accompanied by a narrow ridge which runs from the center of the cucullus and meets the clasper at its apex. Saccus shallow, without process. Aedeagus short and broad, distally deeply incised. Vesica globular with some lobes. Ventrally with a straight sclerotized bar with both sides blunt. Distally with a field of large blunt cornuti, accompanied by a field of chitinous drops. The smaller dorsal lobe without scobination or cornuti.

Female genitalia [gen.prep. KSP42283, KSP42284]: Ostium rim and antrum not sclerotized, ductus bursae short. Transition of cervix bursae and bursa copulatrix unclear, widely connected, both globular but all together rather small. Cervix bursae with a large twisted and folded sclerotized plate and at the right side widely attached to a globular appendix bursae. At the bottom of the bursa copulatrix a small star-shaped signum, covered and edged with sharp thorns.

Distribution: This species has been found during the Foja Mountains Expedition in 2005 in Papua, Indonesia. It is probably endemic for the area.

***Cyana (Cryptanaema) brunnea* (Bethune-Baker, 1904)** (Plate 132 figs 7-8, plate 139 figs 1-2, plate 143 figs 8-9)

Holotype ♂ BMNH: British New Guinea, Upper Aroa River, ii.1903, (Meek), *Chionaema brunnea*. Type.

References: *Chionaema brunnea* Bethune-Baker, 1904. *Novitates zoologicae* 11 (2): 423; Draudt (1914: 173); Rothschild (1915: 48); Strand (1922: 678), as *Chionaema brunnea.*

Diagnosis: Forewings male 11-12 mm, female 13-14 mm. Male with a broad head with large eyes. Head, antennae, palpae and thorax dark brown. Abdomen grey, in the middle darker grey. Thorax and abdomen with long hairs, especially at the ventral side. Pouch along the forewing costa broad with long hairy scales, distal half overlapping the costal rim. Forewing broad, main colour brown with a purple and copper shimmer. At the dorsum in the median field on vein A2+3 a pale yellow streak and a complex pattern of yellow scratches around it. The narrow post-median line slightly undulate and curved to and running over the apex of the costal pouch which in some specimens even forms a costal patch. In some specimens a submarginal row of small yellow dots present but usually faint or absent. Fringes dark grey. Hindwings grey. Underside unicolorous grey-brown, the costal pouch brown.

Female with head, antennae, palpae and thorax brown. Abdomen dark grey. Forewing broad, main colour brown with a slight purple shimmer. Dorsal area with some faint yellow scratches, post-median line yellow, undulate and running obliquely from costa and with a sudden bend running obliquely to dorsum at two-third from base. A faint submarginal row of yellow dots present. A small black discal spot and longitudinal spot more basad. Fringes dark grey. Some specimens are more obscurely patterned but at least some yellow pattern and the black discal spot are present. Hindwings grey. Underside unicolorous grey-brown.

Male genitalia [gen.prep. RV1522]: Uncus straight, long and slender with a sharp apex. Tegumen very broad, with almost circular sides. Valvae of a different type than all other *Cryptonaema* species. Valvae elongate with cucullus at costal rim broadly sclerotized and with long setae which are all directed dorsally, ventral side only slightly sclerotized. A rounded subbasal lobe at the costal rim, costa furthermore straight but with at the very apex ventrally falcate. Sacculus short and rather broad, distal half gradually tapering and with its sharp apex reaching one-third of valvae length. Clasper at the inner rim of the distal part of sacculus elongate






triangular with a long, slender and curved blunt hook. Saccus wide, with a shallow process or keel. Aedeagus rather long and distally gradually narrowing, at distal rim undeeply incised. Vesica at base near the incision of aedeagus with a sclerotized slightly curved bar with at one side small thorns. At globular vesica a double row of sharply hooked cornuti and distally with some larger sharp cone-shaped cornuti, ventral lobe with scobination.

Female genitalia [gen.prep. RV1523]: Ostium rim and antrum strongly sclerotized. Antrum "U"-shaped with a funnel-shaped ventral plate. Antrum a straight tube, at full length sclerotized but at ventral side interrupted, followed by a short ductus bursae. Cervix bursae hardly sclerotized, with numerous wrinkles, and widely connected to the globular bursa copulatrix. A smaller globular appendix bursae attached to a lobe at the right side of the bursa copulatrix. A very small signum as a rosette of blunt thorns present at the lower ventral side of the bursa copulatrix.

Distribution: A rather common species which is found widely distributed in New Guinea in mountainous areas at moderate altitudes.

Key to the *Cyana* species from New Guinea

1 Forewing with red or orange or entirely black with blue shimmer (subgenus ***Clerckia***) 2
– Forewing different 13
2 Forewing entirely black with steel blue shimmer, center of hindwing hyaline ..... *posthyalina*
– Forewing with red or orange 3
3 Males (with costal pouch), forewing deeply red, hindwings entirely black ..... *metamelas*
– Forewing with orange-red to orange-yellow, hindwings with yellow 4
4 Hindwings with black margin dentated at inside ..... *dentimarginata*
– Hindwings with black margin at inside without dentation 5
5 Hindwings with dorsum broadly black 6
– Hindwings with dorsum yellow or narrowly black 8
6 Fringes at dorsum yellow ..... *thoracica* (male)
– Fringes at dorsum black 7
7 Forewings and/or hindwings with orange-yellow postmedian band ..... *thoracica* (female)
– Forewings red with a narrow black rim ..... *trigona*
8 Black rim at forewing tornus conspicuously broader than at termen and costa 9
– Black rim at forewing tornus not distinctly broader than termen and dorsum 11
9 Black margin at forewing termen broad ..... *tegyra retracta*
– Black margin at forewing termen rather narrow 10
10 Black margin at forewing tornus broadly intruding to wing center ..... *tegyra tegyra*
– Black margin at forewing tornus gradually narrowing to wing base ..... *metamelas* (female)
11 Hindwing with black margin equally broad, innerside diffuse ..... *simonthomasi*
– Hindwing with black margin gradually narrowing to tornus 12
12 Forewing orange, black rim narrow, along costa equally thin ..... *tricolora*
– Forewing orange-red, black rim at costa broadening .. .. te*gyra postdivisa*
13 Forewings bone-white with black transverse lines (subgenus ***Cyana***) 14
– Forewings without black transverse lines (subgenus ***Cryptanaema***) 15
14 Forewings with at least 4 transverse lines, including a basal line ..... *transfasciata*
– Forewings with 3 transverse lines, including a basal line ..... *binigrofasciata*
15 Forewings in majority dark brown without distinct pale pattern 16
– Forewings with pale marbled pattern or clear patches 21
16 Hindwings white with dark margin 17
– Hindwings uniformly grey, with or without a darker discal spot 18
17 Hindwing snow-white with dark suffusion along costa and termen ..... *fumea*
– Hindwing bone-white with broad marginal band ..... *melanoplagia extrema* (male)
18 Hindwing grey with a more or less distinct darker discal spot ..... *charybdis*
– Hindwing grey and without a discal spot 19
19 Forewing with distinct dark triangular costal patches ..... *melanoplagia extrema* (female)
– Forewing without distinct triangular costal patches 20
20 Forewing dark brown with (at least traces of a) yellowish post median line ..... *brunnea*
– Forewing dark grey-brown with faint darker pattern .... *aroa*
21 Forewing at costa with a pouch or pocket (**males**) 22
– Forewing costa without a pouch or pocket (**females**) 30
22 Hindwings whitish without complete darker marginal band 23
– Hindwings with a darker marginal band 26
23 Margin of forewing and entire hindwing snow-white ..... *albimarginalis*
– Margin of forewing and entire hindwing not snow-white 24
24 Forewings white with a complex pattern of dark patches ..... *nigroplagata*
– Forewings not white and with a complex dark pattern 25






25 Forewings with large (sub)apical patch, hindwings entirely white ..... *gracilis*
– Forewings with apical patch, hindwings at costa and apex suffused ..... *basialba*
26 Hindwing margin narrow, forewing buff with oblique broken fascia ..... *punctistrigosa*
– Hindwing margin broad 27
27 Forewing with dark oblique stretched triangular tornal patch 28
– Forewing with tornal patch if present not stretched triangular or absent 29
28 Forewing without median transverse lines, reduced dark pattern ..... *melanoplagia* s. s.
– Forewing with median transverse lines, extended pattern ..... *melanoplagia orcheia*
29 Forewing white with broad broken dark median band, head whitish ..... *inusitata*
– Forewing with whitish dorsal patch, head dark brown ..... *zwieri*
30 Hindwing at least half of it whitish or yellowish 31
– Hindwing almost completely grey 34
31 Hindwing completely white, forewings pale grey with dark subapical patch ..... *gracilis*
– Hindwing with broad dark marginal band 32
32 Pale colour in hindwing yellowish, forewing with punctated post median line ..... *punctistrigosa*
– Pale colour in hindwing whitish 33
33 Forewing black with pattern of white patches and spots ..... *nigroplagata*
– Forewing with sharp angled bluish grey median band and central area ..... *molbakon*
34 Forewing for the greater part whitish with dark costal patches 35
– Forewing for the greater part dark brown with white pattern 36
35 Forewings bone-white with sharp dark pattern ..... *melanoplagia melanoplagia*
– Forewings buff with diffuse dark pattern ..... *melanoplagia orcheia*
36 Head whitish ..... *inusitata*
– Head dark brown 37
37 Forewing with white apical patch ..... *basialba*
– Forewing without apical patch, yellowish subapical spot present ..... *zwieri*

Genitalia slides examined (Table 1)

Taxon	♂	♀
Cyana (Cyana) transfasciata	BM-RV1528	BM-RV1529
Cyana (Cyana) binigrofasciata	KSP-24241	
Cyana (Clerckia) metamelas	NHMUK-010313308	
Cyana (Clerckia) posthyalina	RMNH-RV1544	
Cyana (Clerckia) dentimarginata	RMNH-RV1549	
Cyana (Clerckia) tegyra tegyra	BM-RV1545	
Cyana (Clerckia) tegyra postdivisa	RMNH-RV1546	RMNH-RV1547
Cyana (Clerckia) tricolora	RMNH-RV1559	
Cyana (Clerckia) trigona	RMNH-RV1557	RMNH-RV1558
Cyana (Clerckia) simonthomasi	RMNH-RV1550	
Cyana (Clerckia) thoracica	RMNH-RV1555/RV1560/RV1561	BM-RV1548; RMNH-RV1556
Cyana (Cryptanaema) nigroplagata	RMNH-RV1530	RMNH-RV1531
Cyana (Cryptanaema) albimarginalis	KSP-65627	
Cyana (Cryptanaema) basialba	KSP-24243	KSP-24244;RMNH-RV1534
Cyana (Cryptanaema) molbakon		RMNH-RV1567
Cyana (Cryptanaema inusitata		RMNH-RV1535/RV1539/RV1540/RV1541
Cyana (Cryptanaema) zwieri	RMNH-RV1532	RMNH-RV1533
Cyana (Cryptanaema) melanoplagia melanoplagia	BM-RV1512	BM-RV1513
Cyana (Cryptanaema) melanoplagia orcheia	BM-RV1514/RV1518	BM-RV1515/RV1519
Cyana (Cryptanaema) melanoplagia extrema	BM-RV1516	BM-RV1517
Cyana (Cryptanaema) aroa	BM-RV1520	BM-RV1521
Cyana (Cryptanaema) charybdis	BM-RV1524	BM-RV1525
Cyana (Cryptanaema) fumea	RMNH-RV1536	BM-RV1537
Cyana (Cryptanaema) punctistrigosa	RMNH-RV1527	BM-RV1526
Cyana (Cryptanaema) gracilis	KSP-42271	KSP-42283/42284
Cyana (Cryptanaema) brunnea	BM-RV1522	BM-RV1523

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Systematics, taxonomy, and faunistics of the Apomecynini of the Oriental and Australian Region (Coleoptera: Cerambycidae: Lamiinae), part 7

Andreas Weigel [1], **Andrè Skale** [2]

1 – Am Schloßgarten 6, D-07381, Wernburg, Germany; e-mail: rosalia-aw@online.de
2 – Wilhelm Kohlhoff Straße 3, D-95032, Hof, Germany; e-mail: andre.skale@online.de

Abstract: This present contribution presents new taxonomic and faunistic information on 49 taxa of the *Sybra* Pascoe, 1865 genus complex and other genera of the tribe *Apomecynini*. The unjustified synonymy of *Sybra* with *Mycerinopsis* Thomson, 1864 according Slipinski & Escalona (2013) is reversed. *Lamprosybra* Aurivillius, 1928 stat. rev. is considered to be a valid genus, currently with three species: *L. sulcata* Aurivillius, 1928, *L. fuscipennis* Breuning, 1960 stat. nov. and *L. obtusipennis* (Breuning, 1960) comb. nov. Lectotypes are designated for *L. sulcata* and *L. fuscipennis*. The revalidation of the genus *Sybroides* Dillon et Dillon, 1952 stat. rev. and the monotypic species *Sybroides howqua* Dillon et Dillon, 1952 stat. rev. are given. Five species are transferred to *Bityle* Pascoe, 1865 and a key is provided: *Bityle pseudobityle* (Heller 1924) comb. nov., *Bityle basimaculata* (Heller, 1924) comb. nov., *Bityle alboscutellaris* (Heller, 1924) comb. nov., *Bityle modesta* (Heller, 1924) comb. nov. and *Bityle albostictica* (Breuning, 1960) comb. nov. Neotypes are designated for *Sybromimus obliquatus* Breuning, 1940 and *Sybra ochreoguttata* Breuning, 1939. The following synonymies are proposed (valid taxon listed first): *Mycerinopsis lacteola* (Hope, 1841) = *Mycerinus uniformis* Pascoe, 1863 syn. nov., *Bityle alboscutellaris* (Heller, 1924) = *Cylindroplocia helleri* Schwarzer, 1931 syn. nov., *Bityle modesta* Heller, 1925 = *Sybra modestior* Breuning, 1960 syn. nov., *Sybra marcida* Pascoe, 1865 = *Sybra intorta* Breuning, 1939 syn. nov. = *Sybra papuana* Breuning, 1939 syn. nov. = *Sybra pseudogeminata* Breuning, 1939 syn. nov., *Sybra sexguttata* Breuning, 1939 = *Sybra postalbomarmorata* Breuning, 1964 syn. nov., *Sybra fuscovittipennis* Breuning, 1975 = *Sybra baloghi* Breuning, 1975 syn. nov., *Sybra borneotica* Breuning, 1939 = *Apomecyna borneotica* Breuning, 1982 syn. nov., *Sybra ochreovittipennis* Breuning, 1964 = *Sybra samarana* Breuning, 1970 syn. nov., *Sybra latiuscula* Aurivillius, 1927 = *Sybra guamensis* Iwata, 1993 syn. nov., *Sybra porcellus* Pascoe, 1865 = *Sybra proximata* Breuning, 1942 syn. nov., *Sybra baculina* Bates, 1866 = *Sybra ishigakii* Breuning et Ohbayashi, 1964 syn. nov. = *Atimura fulva* Schwarzer, 1925 syn. nov., *Falsepilysta ochraceomaculata* (Schwarzer, 1931) = *Inermomulciber schultzei* Breuning, 1974 syn. nov. = *Plocia affinis* (Breuning & Villiers, 1983) syn. nov., *Falsepilysta olivacea* (Schwarzer, 1931) = *Mimosybra albosignata* Breuning, 1982 syn. nov., *Mimosybra schultzei* (Breuning, 1966) = *Sybra mimalternans* Breuning, 1970 syn. nov. = *Mimosybra alternans* Breuning, 1973 syn. nov. Furthermore, the following five species are transferred to the genus *Mimosybra* Breuning, 1939: *Mimosybra annulata* (Heller, 1924) comb. nov., *Mimosybra bimaculata* (Breuning, 1939) comb. nov., *Mimosybra biplagiata* (Breuning, 1939) comb. nov., *Mimosybra borneana* (Breuning, 1961) comb. nov. and *Mimosybra strandi* (Breuning, 1939) comb. nov. Finally two corrections to Skale & Weigel (2012) and Skale & Weigel (2014) are given.

Key words: Lamiinae, *Bityle*, *Falsepilysta*, *Lamprosybra*, *Mimosybra*, *Mycerinopsis*, *Sybra*, *Sybromimus*, faunistics, lectotype designation, neotype designation, new combinations, new synonymies, revalidation, Oriental, Australian.

Introduction

In the current paper we present additional new data within the tribe Apomecynini based on recent studies. We propose a number of new synonymies and combinations as corrections for the confusion which exists in the Oriental and Australian Apomecynini. Additionally, a number of holotypes for type species of some genera are missing, particularly type material deposited in the Hamburg Museum which was destroyed in World War II. Now, we designate neotypes for two of those species: *Sybromimus obliquatus* Breuning, 1940 and *Sybra ochreoguttata* Breuning, 1939. Both eligible specimens are from the type localities and agree well with the original descriptions, making this possible.

Numerous taxonomic changes given by Slipinski & Escalona (2013), consistently without justifications, are not helpful whatsoever.





Synonymies of many genera within the Australian Apomecynini broadly affect taxonomic nomenclature (i.e. a lot of nomina nova are assigned) concerning Oriental genera and species. The suggested synonymy of the genera *Sybra* Pascoe, 1865 and *Mycerinopsis* Thomson, 1864 is particularly questionable. The study of the type specimen of the type species of the genus *Mycerinopsis, M. aridus* Pascoe, 1862, has shown that both genera are valid. The currently valid Oriental species in the genus *Mycerinopsis* (Breuning 1964a) are heterogeneous and in all probability belong to various genera. As before, the species rich genus *Sybra* contains a very complex species inventory. In the current work, some species will be transferred into two distinct genera, one to the genus *Lamprosybra* Aurivillius, 1928, with three species from Samoa at present, and five to the genus *Bityle* Pascoe, 1865, now with six species from Sulawesi and the Philippines. The latter genus was revalidated by Weigel & Skale (2009).

Materials and methods

For the present study, 52 type specimens and 169 additional specimens were examined. The genitalia for most of the male specimens were examined. For type material, genitalia were only examined if the material was in good condition. The dissected genitalia were fixed onto a white card together with the specimen. For the method of dissection and the terms of the male genitalic structures see Weigel & Skale (2009). Photographs were taken with a Leica stereo microscope Z6 APOA, for genitalia pictures a Planapo-lens 5.0 was used, and subsequently processed and measured with the Leica Applications-software 4.0. The final processing was made with Adobe Photoshop 7.0. Body length was measured from the front margin of the clypeus to the apex of the elytra. Before making photographs of male genitalia, all structures were immersed for a minimum of 24 hours in 80% lactic acid, subsequently the "fibula" and the 8th tergite were photographed in this liquid.

For photographs, the tegmen and aedeagi were fixed on transparent platelets.

Label data of types are cited in their original text, using a slash "/" to separate different lines and using two slashes "//" for different labels. Additional remarks by the authors are cited in [ ]. For non-type specimens, no special separation is given for lines on the labels.

Abbreviations used in the text:

Museum and collection acronyms:
BPBM – Bernice P. Bishop Museum, Honolulu, U.S.A.;
BMNH – British Museum of Natural History, London, United Kingdom;
CHH – collection D. Heffern, Houston, Texas, U.S.A.;
CMI – collection H. Makihara, Ibaraki, Japan;
CMS – collection O. Mehl, Natural History Museum of Denmark, Copenhagen;
CSH – collection A. Skale, Hof, Germany;
CTO – collection T. Tichy, Ostrava, Czech Republic;
CTV – collection V. Nagiryni, Tartu, Estonia;
CVB – collection E. Vives, Barcelona, Spain;
CWW – collection A. Weigel, Wernburg, Germany;
CYR – collection Y. Yokoi, Ratingen, Germany;
CZW – collection H. Zettel, Vienna, Austria;
EUMJ – Ehime University, Matsuyama, Japan;
HNHM – Hungarian National History Museum, Budapest, Hungary;
ISNB – Institut Royal des Sciences naturelles de Belgique, Brussels, Belgium;
JMU – Julius-Maximilians-Universität, Würzburg, Germany;
MNHN – Muséum National d'Histoire Naturelle, Paris, France;
NHRS – Naturhistorika Riksmuseet Stockholm, Sweden;
NSMT – National Science Museum Tokyo, Japan;
NUK – Nihon University Kanagawa, Japan;
OUMNH – Oxford University Museum of Natural History, Oxford, United Kingdom;
SMF – Senckenberg Museum, Frankfurt am Main, Germany;
SMNS – Staatliches Museum für Naturkunde Stuttgart, Germany;
SMTD – Senckenberg Staatliches Museum für Tierkunde Dresden, Germany;
USNM – United States National Museum, Washington D.C., U.S.A.;
ZMB – Zoologisches Museum der Humboldt Universität Berlin, Germany;
ZMH – Zoologisches Museum Hamburg, Germany;
ZSM – Zoologische Staatssammlung München, Germany.

Collectors:
IF – leg. A. Floren (JMU);
IS – leg. A. Skale;
IW – leg. A. Weigel;
IY – leg. Y. Yokoi.

Additional:
spm(s) – specimen(s);
HT – holotype;
PT – paratype;
ST – syntype.






Taxonomic part

1. The genus *Mycerinopsis* Thomson, 1864

***Mycerinopsis* Thomson, 1864: 50**
Mycerinopsis lacteola (Hope, 1841)
Hathlia lacteola Hope, 1841: 50 (Plate 144 figs 1-3, 8)
Mycerinus aridus Pascoe, 1862: 466 (Plate 144 figs 4-7, 9)
Mycerinus uniformis Pascoe, 1863: 546 **syn. nov.**
Mycerinopsis avida Thomson, 1864: 50 [misspelling]

Type material: *Mycerinus aridus* HT ♀ BMNH: Lizard / Island [handwritten, green ellipsoid label] // Hathlia / arida / Typ Pascoe [handwritten] // Mycerinopsis / arida / Lizard. I. Pasc [handwritten] // Type [round label with red border] // Pascoe / Coll. / 3-60, condition: well preserved, right antenna with 4 antennomeres, right protarsus with 2 tarsomeres, body size: 12.7 mm; *Hathlia lacteola* colour photo (picture by Ms. Amoret Spooner) from HT ♂ OUMNH: lacteola / Hope P. Ess. [handwritten = Port Essington] // TYPE // Hope / Proc. Ent. Soc. / I. P. 50 / Coll.Hope Oxon. [red edged] // TYPE Col: 1867 / Hathlia / lacteola / Hope / HOPE DEPT. OXFORD, condition: completely preserved, body size: 13.5 mm.
Additional material (6 spm): 1♂ BMNH: Praonetha sublineata Guer., Port Essington?, Australia septentr., Bowr. Chevr., 63.47*; 1♀ BMNH: Lizard Isl.; 1♂ BMNH: Cairns N. Queensland, G. E. Bryant, F. P. Dodel 1911 [handwritten], G. Bryant Coll., 1919.-147, Mycerinopsis lacteola Hope, Breuning dèt.; 1♂ BMNH: Mycerinus uniformis, Pascoe Coll., 93-60, 143 [possibly the type of *Mycerinopsis uniformis*]; 1♀ CWW: Australia Qld., Atherton Umg., 27.12.61 15.1.62, leg. H. Demarz; 1♀ CWW: AUS13, NT46, Roper Bar, Roper River Cr., 15m, 14°42'50"S, 134°30'31"E, 4.5.2013, M. Baehr.

Remarks: Slipinski & Escalona (2013) synonymized the genera *Mycerinopsis* Thomson, 1864 and *Sybra* Pascoe, 1865 without explanation. A suggestion of this problem was presented by Skale & Weigel (2014). The examination of the type species of this genus, *Mycerinus aridus* Pascoe, has confirmed the synonymy is not justified, hence the genera *Mycerinopsis* and *Sybra* are not congeneric. The catalogue of Junk-Schenkling (Aurivillius 1921) listed both species *Mycerinopsis lacteola* and *Mycerinopsis arida* as distinct taxa. Probably Breuning (1939) is responsible for the synonymy of these two species. In the description of *Mycerinopsis spinipennis* Breuning, 1939 he wrote „Der lacteola Hope (= arida Pascoe) nahestehend...". Also McKeown (1947) follows this synonymy in the "Catalogue of the Cerambycidae (Coleoptera) of Australia". We confirm this synonymy and we also consider these two species to be conspecific.
The differentiation of *Mycerinopsis* from *Sybra* is as follows:

- no rows of punctures on the elytra as main characteristic
- whole body covered with poriferous setae (such setae are often rubbed off or poorly recognisable under adhered tomentum)
- fore legs with longer protruding hairs
- with a distinct long setae below the lower eye lobes (see Plate 144 fig. 7) (all examined species of *Sybra* have a distinct setae beside the inner eye lobes only
- antennae of males remarkably longer in females and most of *Sybra* species, protarsus wider, elytra narrowing apically, apex distinctly attenuated
- scutellum very wide, with the middle smooth and glossy
- antennae comparatively thick and densely fringed beneath
- labrum and foreborder of the clypeus with very prominent (yellowish) hairs
- pronotum with a narrow smooth longitudinal line.

The male of *M. lacteola* is similar to species of the genus *Trichohestima* Breuning, 1943. The large genus *Sybra* still contains a really heterogeneous species mixture as previously mentioned several times. In the future, more species will be assigned to different genera. Other species of *Mycerinopsis* from the Oriental region and New Guinea listed in Breuning (1964a) or described later (Breuning 1968; 1973; Hayashi 1972) do not belong to this genus and should be placed under *Zotale* Pascoe, 1866 in future.

Already Pascoe (1863) pointed out under the description of *M. uniformis* (type locality: Australia, Port Denison) its similarity to the species *M. arida* and wrote furthermore that *M. uniformis* may only be a local variety of *M. arida*. Breuning (1964a) wrote that the type specimen is probably lost. A specimen in the BMNH is labelled as *M. uniformis* by Pascoe himself. It is possibly the type specimen but without labels of origin. Based on the examination of this specimen and verification with the description (Pascoe 1863) we assume the two species are conspecific and *M. uniformis* **syn. nov.** is simply an individual variation of *M. arida*.






2. The genus *Lamprosybra* Aurivillius, 1928

Species catalogue of the genus *Lamprosybra*

Lamprosybra Aurivillius, 1928: 144 **stat. rev.**
Lamprosybra sulcata Aurivillius, 1928: 144 (Plate 145 figs 1-4)
Sybra sulcata Breuning, 1960: 142
Lamprosybra fuscipennis Aurivillius, 1928: 145 **stat. nov.** (Plate 145 figs 5-8)
Lamprosybra sulcata v. *fuscipennis* Aurivillius, 1928: 145
Sybra sulcata m. *fuscipennis* Breuning, 1960: 142
Lamprosybra obtusipennis (Aurivillius, 1928: 147) **comb. nov.** (Plate 145 fig. 9)
Oopsis obtusipennis Aurivillius, 1928: 147
Sybra obtusipennis Breuning, 1960: 142

Type material: *Lamprosybra sulcata* ST ♂ BMNH: Type [round label with red borders] // Malololelei / Upolu Samoa / 2000 feet / 22.iii.1924 [handwritten] / Buxton & Hopkins // Brit. Mus / 1928-25. // 139 // Lamprosybra / sulcata / Auriv. ♂ / Det. Prof. C. Aurivillius. // Typus [red label] // LECTOTYPUS / Lamprosybra / sulcata / des. Skale & Weigel 2016, hereby designated as lectotype, condition: left antenna with 9 antennomeres, well preserved otherwise, body size: 10.7 mm; ST ♀ NHRS: Malololelei / Upolu Samoa / 2000 feet / 22.iv.1925 [handwritten] / Buxton & Hopkins // 140 // Lamprosybra / sulcata / Auriv. ♂ / Det. Prof. C. Aurivillius. // 9892 / E92 // NRM Sthlm / Loan 1066/09, condition: left antenna with 2 antennomeres, well preserved otherwise, body size: 10.7 mm; *Lamprosybra sulcata* m. *fuscipennis* ST ♂ BMNH: Type [round label red edged] // Tutuila / Samoa // Pago Pago / 9-22-23 // Swezey & / Wilder // Brit. Mus / 1928-25. // 143 // Lamprosybra / sulcata Auriv. / var. fuscipennis / Auriv. ♂ / Det. Prof. C. Aurivillius. // Typus [red label] // LECTOTYPUS / Lamprosybra / fuscipennis / des. Skale & Weigel 2016, hereby designated as lectotype, condition: right middle leg missing, tomentation somewhat rubbed, body size: 10.6 mm.

Additional material: *Lamprosybra sulcata* 1♂ BMNH: Samoa Is, Upolu, Malololelei, Lamprosybra sulcata Auriv. ♂, Data unreliable, see Brit. Mus., 1949-314. body size: 10 mm.

Remarks: Aurivillius (1928) described the genus *Lamprosybra* for nine specimens (syntypes) from the Samoan Islands (BMNH/NHRS). Four syntypes belong to the nominative form *L. sulcata* and 5 syntypes belong to *S. sulcata* v. *fuscipennis*. From the former we examined 2 male syntypes (BMHN/NHRS) and from the latter 1 male syntype (BMNH). Based on our study, our opinion is that the synonymy of *Lamprosybra* with *Sybra* according Breuning (1960) is not justified. With respect to the genus *Sybra* (Weigel & Skale 2009) based on the diagnosis of *Sybra stigmatica* (Pascoe, 1859), the genus *Lamprosybra* shows several differences establishing its validity:

- surface intensely glossy, partly with metallic lustre
- elytra with distinct costae, especially on the posterior half
- legs and antennae longer as in *Sybra*
- endophallus without fibula (see Weigel & Skale 2009).

Aurivillius (1928) described *S. sulcata* v. *fuscipennis* as a variety; according to ICZN (1999) (Art. 45.6.4) it has subspecific rank. We consider *Lamprosybra fuscipennis* **stat. nov**. as a distinct species with the following differentiation from *L. sulcata*:

- brown elytra according to Aurivillius (1928), however the examined specimen has a metallic lustre
- white maculae on the elytra smaller, linearly arranged maculae on the posterior half more oblique
- lateral margins of pronotum more rounded, distinctly less punctured dorsally and without yellowish longitudinal lines
- elytra less parallel
- scutellum twice as wide as long, posterior border straight and completely without tomentum, in *L. sulcata* scutellum subquadrate, posterior border somewhat acuminate (but this might be a variable character) and with tomentum in the middle
- differences in male genitalic structures, especially the tegmen (Plate 145 figs 4–9).

Aurivillius (1928) described *Oopsis obtusipennis* based on three specimens (2♂ & 1♀) from Samoa (type locality: Tutuila: Pago Pago). Judging from type pictures (HT in BMNH, 1 PT in BPBM), this species is closely related to both of the above mentioned species of *Lamprosybra*. *L. obtusipennis* **comb. nov.** is very similar to *L. sulcata* and both species may eventually prove to be conspecific. The pronotum has two narrow, yellow longitudinal lines, the middle of the scutellum has tomentum, the lateral margins of the pronotum are rounded and the surface is strong punctured. However, the body size is less (6-8 mm). The yellow






maculae on the elytra are more extended. The pronotum and elytra are covered with fine, white adpressed hairs.

3. The genus *Bityle* Pascoe, 1865

Species catalogue of the genus *Bityle* (Plate 146 figs 1-9)

Bityle Pascoe 1865: 141
Cylindroplocia Heller, 1924: 205
Bityle bicolor Pascoe, 1865: 221
Bityle pseudobityle (Heller, 1924: 206) **comb. nov.**
crucifera Heller, 1924: 207 (nomen nudum)
Bityle basimaculata (Heller, 1924: 206) **comb. nov.**
teres Heller, 1924: 207 (nomen nudum)
Bityle alboscutellaris (Heller, 1924: 206) **comb. nov.**
helleri Schwarzer, 1931: 76 **syn. nov.**
Bityle modesta (Heller, 1924: 207) **comb. nov.**
modestior Breuning, 1960: 148 (nomen novum) **syn. nov.**
Bityle albostictica (Breuning, 1960: 480) **comb. nov.**

Diagnosis: Previously, Weigel & Skale (2009) validated the genus *Bityle* Pascoe, 1865 with the type species *B. bicolor* Pascoe, 1865. Heller (1924) established the genus *Cylindroplocia* Heller, 1924, with the type species *C. pseudobityle* Heller, 1924, later synonymized by Breuning (1960) with the genus *Sybra*. Despite Heller (1924) calling his type species "pseudobityle" which could be a reference to the genus *Bityle,* he simply compared it with the genus *Plocia* Newman, 1842. According to the examination of type material, we consider *Cylindroplocia* and *Bityle* congeneric. The genus *Bityle* currently has six valid species with a body size range of 7-12 mm. Species are black with a distinct white tomentum on the head, tibiae, femora, tarsi and ventral side of the body. Surface is completely bright (*B. modesta*) or covered with bands and maculae. Elytra are parallel-sided and are about 2.5 to 3 times as long as wide. Pronota are subquadrate. Elytra are coarsely punctured. Elytra have 10 distinct, punctate lines almost attaining the apex, punctured somewhat irregularly below humerus and around scutellum. The species of *Bityle* can be distinguished from those of *Sybra* as follows:

- pronotum parallel–sided (except similar in a couple of *Sybra* species, like *S. elongatissima* Breuning, 1939 or *S. rouyeri* Pic, 1938)
- distinct white bands and maculae on the black pronotal and elytral surface
- 7th and 8th antennomeres or additionally, the apex of 6th and base of 9th to 10th conspicuous white
- dorsal surface of the tarsomeres white tomentose
- genae as long as inferior eye lobes, therefore much longer than in most species of *Sybra*
- frontal border of clypeus with long hairs
- elytral apex spiniform (scarcely only by *B. bicolor*)
- endophallus without fibula (sensu Weigel & Skale 2009).

Distribution: The type species, *B. bicolor*, occurs on the Indonesian island of Sulawesi, while all others are distributed on the Philippine Islands (Luzon, Mindanao).

Key to *Bityle* species

1 Surface uniformly white tomentose ..... *B. modesta*
– Elytra with distinct white lines or maculae 2
2 Pronotum mostly white tomentose, elytra with four white tomentose transverse lines, elytral apex slightly acuminate ..... *B. bicolor*
– Pronotum bare or covered with white lines, elytral apex obviously acuminate (this character is variable) 3
3 Antennomeres 1-3 internally densely white tomentose, pronotum with two white longitudinal lines, scutellum densely white tomentose, below the lower eye lobes strongly and extensively punctured ... *B. alboscutellaris*
– Antennomeres 1-3 internally without conspicuous white tomentum, scutellum bare or slightly with white tomentum, a series of rough punctures or less below the lower eye lobes 4
4 Antennomeres 6-11 white tomentose, elytra with numerous small white maculae ..... *B. albostictica*
– Antennomeres 7-8 or additionally top of the 6th and base 9th-10th white tomentose, elytra at least with two white lines and larger macules 5
5 Elytral base with white maculae, antennomeres 7-8 white tomentose ..... *B. basimaculata*
– Elytral base without maculae, antennomeres 7-8, base of 9th and partly 10th white tomentose .....
..... *B. pseudobityle*

***Bityle bicolor* Pascoe, 1865: 221** (Plate 146 fig. 1)
Sybra bicolor Breuning, 1960: 147
Sybra bicolor m. *alboscutellata* Breuning, 1958: 21

Type material: Both type specimens were previously examined (see Weigel & Skale 2009).





***Bityle pseudobityle* (Heller, 1924) comb. nov.**
(Plate 146 figs 2-3)
Cylindroplocia peudobityle Heller, 1924: 206
Cylindroplocia pseudobitile [misspelling] a. *crucifera* Heller, 1924: 206 (nomen nudum) (Plate 146 fig. 3)
Sybra pseudobityle Breuning, 1960: 147
Sybra pseudobityle m. *crucifera* Breuning, 1960: 147

Type material: *Bityle pseudobityle* HT ♀ SMTD: Mt. Makiling / Luzon, Baker // 2844 [handwritten] // [red label] pseudobityle [handwritten] / typus // Staatl. Museum für / Tierkunde, Dresden, condition: well preserved, right antenna with only 3 antennomeres, body size: 7.8 mm; *Bityle pseudobityle* ab. *crucifera* HT ♀ SMTD: Mt. Makiling / Luzon, Baker // 8383 [handwritten] // [yellow label] 1924 / 6. // [red label] crucifera [handwritten] / typus // Staatl. Museum für / Tierkunde, Dresden, condition: completely preserved, body size: 6.8 mm.
Additional material (9 spm): 1♀ CVB [relatively large 10.4 mm, scutellum white tomentose]: Filipines S, Surigao del S, local collector: Mindanao, IV.2012; 1♂ ZSM: Phil., II.96, Panay, Sybra pseudobityle Hüdepohl, det. 1997 [body size: 8.1mm]; 1♀ SNMS: Philippines: Leyte, Visca N Baybay, cultiv. land., 1.3.1991, leg. Schawaller et al., 1.3.1991, Sybra pseudobityle Hell., Hüdepohl det. 199? [body size: 9.5 mm]; 3 spm SMTD: Tacloban, Leite, P. I., Coll. W. Schultze, Ankauf 1942, Staatl. Museum für Tierkunde, Dresden; 1♂ & 2♀ SMTD & CWW: Catanduanes, Virac, P. I., Coll. W. Schultze, Ankauf 1942, Staatl. Museum für Tierkunde, Dresden [body size: 7.4 mm/ 8.6 mm/ 10.2 mm].

Distribution: Philippines: Catanduanes, Leyte, Luzon, Mindanao.
Size: 6.8-10.4 mm (Breuning 1964a: 7.5 mm).
Remarks: Underside completely white tomentose, width-length ratio of pronotum: 1.09, lateral margin straight; elytra width-length ratio: 2.8; scutellum without white tomentum; the specimen described as ab. *crucifera* (Plate 146 fig. 3) closely matches the HT of *B. pseudobityle*, the white maculae on the elytra are somewhat different only and the tomentum of the anterior part of the pronotum is more distinct (somewhat rubbed on the HT of *B. pseudobityle*), antennae longer than body in both sexes (9th antennomere extending beyond apex of elytra) and antennomeres 7-8 with conspicuous white tomentum).

***Bityle basimaculata* (Heller, 1924) comb. nov.**
(Plate 146 fig 4-5)
Cylindroplocia basimaculata Heller, 1924: 206
Cylindrobityle [misspelling] *basimaculata* a. *teres* Heller, 1924: 207 (nomen nudum) (Plate 146 fig. 5)
Sybra basimaculata Breuning, 1960: 147
Sybra basimaculata m. *teres* Breuning, 1960: 147

Type material: *Bityle basimaculata* HT ♂ SMTD: Los Banos / P. I. Baker // 1116 [handschriftlich] // [yellow label] 1924 / 6. // [red label] basimaculata [handwritten] / typus // Staatl. Museum für / Tierkunde, Dresden, condition: well preserved, right antenna with only 8 antennomeres, body size: 8.5 mm; *Bityle basimaculata* a. *teres* HT ♂ SMTD: Mt. Makiling / Luzon, Baker // [yellow label] 1924 / 6. // [red label] teres [handwritten] / typus // Staatl. Museum für / Tierkunde, Dresden, condition: completely preserved, body size: 7.2 mm.
Additional material: 2 spm SMTD & CWW: Luzon, P. I., Montalban, Coll. W. Schultze, Ankauf 1942, Staatl. Museum für, Tierkunde, Dresden; 1♂ SMTD: without data.

Distribution: Philippines: Luzon, Northern Luzon (Vives 2015).
Size: 7.2-8.5 mm (Breuning 1964a: 7-8.5 mm).
Remarks: Underside completely white tomentose, width-length ratio of pronotum: 1.12; body a bit longer than in *B. pseudobityle* with elytra width-length ratio: 2.97; elytral base each with a roundish white macula; pro- and mesofemur somewhat stouter than in *B. pseudobityle*, scutellum without white tomentum; 7th, 8th and base of 9th antennomeres with conspicuous white tomentum; the specimen described as m. *teres* (Plate 146 fig. 5) with a slightly longer pronotum (width-length ratio: 1.2) and different elytral tomentum, all other features correspond to the HT of *B. basimaculata*.

***Bityle alboscutellaris* (Heller, 1924) comb. nov.**
(Plate 146 figs 6-7)
Cylindroplocia alboscutellaris Heller, 1924: 206
Sybra alboscutellaris Breuning, 1960: 147
Cylindroplocia helleri Schwarzer, 1931: 76 **syn. nov.** (Plate 146 fig. 7)
Sybra helleri Breuning, 1960: 147

Type material: *Cylindroplocia alboscutellaris* HT ♀ SMTD: Zamboanga / Mindanao / Baker // [red label] alboscutell??? [handwritten; last 3 letters illegible] / typus // Staatl. Museum für / Tierkunde, Dresden, condition: well preserved, right antenna only with 9, left antenna with only 3 antennomeres, body size: 8.9 mm; *Cylindroplocia helleri* HT ♂ SMF: Momungan / Mindanao // Typus [red label with black border] Col. 135 [handwritten at underside] // Cylindoplocia / helleri Schwarzer / det. Schwarzer 1930, condition: well preserved, only right protarsus missing, body size: 7.3 mm.
Additional material: 1♀ SMTD: Ankauf Muche,






Staatl. Museum für Tierkunde, Dresden, body size: 7.8 mm.

Distribution: Philippines: Mindanao.
Size: 7.3-8.9 mm (Breuning 1964a: 7.5-9 mm).
Remarks: Ventral side completely white tomentose; each side of the pronotal disk with a white tomentose longitudinal line, scutellum contrasting white tomentose; antennae not reaching elytral apex in both sexes; internal sides of antennomeres 1-4, entire antennomeres 7-8 and base of 9th conspicuously white tomentose; features given in Schwarzer (1931) for differentiation of both species *B. helleri* and *B. alboscutellaris* are incorrect or correspond to individual variations: *„kräftig punktiertes Halsschild, etwas andere Form der Binden auf den Flügeldecken und nicht vollständig grau behaarte Fühler, Kopf weißlich behaart“*, slight differences (width-length ratio for pronotum and elytra) based on sexual dimorphism; following the comparison of the type specimens of *B. alboscutellaris* and *B. helleri,* we consider them conspecific.

***Bityle modesta* (Heller, 1924) comb. nov.** (Plate 146 fig. 8)
Cylindroplocia modesta Heller, 1924: 207
Sybra modestior Breuning, 1960: 148 (nomen novum) **syn. nov.**

Type material: *Cylindroplocia modesta* HT ♂ SMTD: Zamboanga / Mindanao / Baker // 1924 / 6 [handwritten] // C. modesta [handwritten] / typus [red label] // Staatl. Museum für / Tierkunde, Dresden, condition: left foreleg missing, left antenna only with one antennomere, body size: 7.8 mm,
Additional material: 1♂ ISNB, 3♀ ISNB & CWW: coll. I. R. Sc. N. B., Philippines, Mindanao, South Cotabato Prov., Tasaday Res., MT Tasaday Libuta, 6°18'N, 124°33'E, 1220-1460m, X-XI/1990, I.G.28.419, Don leg-Pascal Lays.

Distribution: Philippines: Luzon, Mindanao (Heller 1924; Breuning 1964a).
Size: 6-7.8 mm (Breuning 1964a: 4.5-7.5 mm).
Remarks: Whole body uniformly tomentose whitish to light grey, tomentum not dense, black body coloration visible through tomentum; antennomeres 7-8 white tomentose; the nomen novum given by Breuning (1960) is unnecessary.

***Bityle albostictica* (Breuning, 1960) comb. nov.** (Plate 146 fig. 9)
Sybra albostictica Breuning, 1960: 480
Type material: *Sybra albostictica* colour photograph of the HT (ZMB) from the type locality: Philippines: Luzon, Innugan.
Additional material (2 spms): 1♂ CTO: May 2013, Philippines, Dupax del sur, Nueva Vizcaya, col. Ismael, Luzon; 1 spm CVT: Nueva Viscaya, North Luzon, Philippines, January 2011, local collector.

Distribution: Philippines: Luzon.
Size: 10.8-12 mm (Breuning 1964a: 10.5 mm).
Remarks: Both examined specimens correspond to the HT (ZMB) of this species according to the available colour photograph. *B. albostictica* is the largest species of the genus *Bityle*.

4. Neotype designation for *Sybromimus obliquatus*

***Sybromimus obliquatus* Breuning, 1940: 167** (Plate 147 figs 1-2)

According to Breuning (1940), the type specimen with the type locality “Tonga Inseln” was deposited in the Museum of Hamburg (ZMH). The major part of the entomological collection of this museum was destroyed during World War II. Therefore, the HT of *Sybromimus obliquatus* is presumed destroyed. To define the species, we hereby designate a neotype. A specimen erroneously pictured as the “type” in the revision of the Apomecynini (Breuning 1964a: plate vii fig. 58) is deposited in the ZMB. We select this female specimen as the neotype for *Sybromimus obliquatus* (Plate 147 fig. 1) with the following label data:

1. label: Fji
2. label: 41046
3. label: Feejee Isl. Thorey [big black label handwritten with lead pencil]
4. label: Hist. Coll. (Coleoptera) / Nr. 41046 / Prasnetha ? / spec. / Feejee Isl. Thorey / Zool. Mus. Berlin [blue label with black borders]
5. label: Sybromimus / obliquatus Breun. / Breuning dèt.
6. label: NEOTYPUS / SYBROMIMUS / obliquatus / des. Weigel & Skale 2016.

The neotype is well preserved and affixed with glue onto a white paper card. The body size is 6.2 mm.

Description of the neotype
Size: 6.2 mm, width at humeri: 1.9 mm.
Body underside, head and pronotum dark brown, otherwise light brown and whole body covered with




fine adpressed greyish to yellowish hairs; surface dull glossy and finely shagreened.

Head: punctation coarse and nearly dense except for antennal insertions and genae, inter-punctational distances about the same as their diameters; frontal border of clypeus straight; frons broader than high, with dense adpressed whitish hairs, above and across with hair twisted or swirly; eyes coarsely faceted; lower eye lobes squarish, nearly as long as genae.

Antennae: light brown (probably faded), slightly shorter than body; scape very short, about half as long as 3rd antennomere, distinctly thickened near middle; base of (4th) 5th-8th antennomeres white tomentose; 3th antennomere the longest; ratio of antennomeres: 0.56/ 0.15/ 1.0/ 0.96/ 0.56/ 0.51/ 0.44/ 0.38/ 0.36/ 0.33/ 0.38; all antennomeres with fine adpressed hairs, sparse yellowish hairs and fringed beneath.

Pronotum: nearly squarish; whitish to yellowish adpressed hairs partly swirly; length-width ratio: 0.92; lateral margin weakly rounded, scarcely constricted before base; base straight; disc and lateral very coarsely punctate, separation of punctures usually less than their diameters; disc with two longitudinal lines, diverging forward, and continued at the base of each elytron, scarcely tomentose between both whitish discal lines.

Elytra: length-width (base) ratio: 2.32; ratio base-width/pronotal-width: 0.8; elytral punctures faintly arranged in rows up to the apical third, roughly punctured around scutellum, very finely punctate back- and outwards and absent in the last third; five flattened costae primarily in the discal area; last elytral third with more distinct whitish hairs, anterior border of macula obliquely directed forward from suture to lateral margin; scutellum broadly triangular, glossy and scarcely yellowish tomentose; epipleura reaching nearly to end of 4th sternite, scarcely hairy and impunctate; apex singly rounded, very weakly, obliquely truncate.

Legs: light brown, apical part of tibia and tarsus yellowish, with fine adpressed whitish and yellowish hairs; femur thickened near middle; protibia slightly sinuate internally; 1st tarsomere distinctly longer than 2nd, 3rd about long as 1st and claws as long as 1st to 3rd combined; 3rd tarsomere deeply emarginate almost to base; hind femur extending to end of 3rd sternite.

Ventral side (Plate 147 fig. 2): with scarcely adpressed whitish and yellowish hairs; meso- and metacoxa with rough punctures only laterally, with separation greater than their diameters; metepisterna, metepimera and anterior part of the metacoxa with rough punctures; abdomen dull and impunctate; 1st sternite distinctly longer than 2nd and 3rd, and 4th sternite shorter than 2nd, hind border of 4th sternite almost semicircular emarginate, 5th sternite longer than 3rd and 4th together, strongly narrowed posteriorly, in middle of hind border with a weak impression; head glabrous and glossy beneath, anterior border and lateral area with single rough punctures; procoxa closed behind, prosternum extended posteriorly.

Remarks: *S. obliquatus* corresponds to the genus *Sybra* Pascoe, 1865 in most morphological features, thus, this species probably belongs to this genus. Unfortunately there is no male specimen available to examine the genitalic structures for confirmation of generic placement. Therefore, at this time, *Sybromimus* is a valid genus.

According to Breuning (1960; 1964a) *Sybroides howqua* Dillon et Dillon, 1952 and *S. obliquatus* are conspecific and consequently the monotypic genus *Sybroides* Dillon et Dillon, 1952 is synonymous with *Sybromimus*. However, based on a colour photograph of the HT (BPBM), this synonymy is unjustified. Due to a different shape of the pronotum and a different elytral tomentum, *Sybroides howqua* is easily distinguished from *S. obliquatus*. At the moment the generic placement is unclear and we revalidate this genus and species herein:

Sybroides Dillon et Dillon, 1952: 93 **stat. rev.**
Sybroides howqua Dillon et Dillon, 1952: 93 **stat. rev.**

5. Neotype designation for *Sybra ochreoguttata*

***Sybra ochreoguttata* Breuning, 1939: 261** (Plate 147 figs 3-11)

Sybra ochreoguttata was described by Breuning (1939) for one specimen from the Philippine island of Luzon (Laguna), and the HT was deposited in the ZMH. Unfortunately, as with other *Sybra* specimens deposited there, the holotype is presumed destroyed. During our research, we found a small number of specimens corresponding to this distinctive species. A female specimen from Mindanao (Philippines) deposited in the SMTD has a handwritten label with "*Sybra ochreoguttata Br. Breuning dèt*". This specimen conforms well with additional six specimens from the SMF in all morphological features. Furthermore, the comparison with the original description (Breuning 1939) has confirmed it as *S. ochreoguttata*. We






now designate a male specimen from the SMF collection as the neotype from the type locality with the following label data:

1. label: Vivac / S.O. Luzon
2. label: Coll. B. / Schwarzer
3. label: NEOTYPUS / Sybra / ochreoguttata (Breuning 1939) / des. Skale & Weigel 2017.

The neotype is well preserved (the right antenna has only 10 antennomeres and the right metatarsus is missing the claw), and is affixed with glue onto a white paper card. The body size is 9 mm. *S. ochreoguttata* has a close relationship to *Sybra alternans* (Wiedemann, 1823) in external morphological features as well as in the shape of the fibula (see Weigel & Skale 2016).

Additional material (4 spms): 1♂ & 1♀ SMF: Vavac S.O. Luzon, Coll. B. Schwarzer; 1♂ SMF: Albay S. Luzon, Coll. B. Schwarzer; 1♂ SMF: Mt. Isarog S. Luzon, Coll. B. Schwarzer; (further 3 spms det. cf.): 1♂ SMF: Momungan Mindanao , Coll. B. Schwarzer; 1♀ SMTD: Mindanao, Zamb. Zamboanga coll. W. Schultze, Coll. W. Schultze Ankauf 1942, Staatl. Museum für Tierkunde Dresden, Sybra ochreoguttata Br. [handwritten] Breuning dèt.; 1♀ CTO [det. cf.]: FEB 2013, Philippines, Mt. Matutum, S Mindanao, col. Ismael, Mindanao.

Description of the neotype
Size: 9 mm, width at humeri: 2.3 mm.
Head: Brown; maxillary palpus light brown, last segment slender, pointed, distinctly longer than the preceding; mandibles dark brown, basal part distinctly yellowish tomentose; clypeus brown, slightly lighter than frons, anterior border straight; frons wide, between eyes stramineous tomentose, this pubescence forward-facing, feebly glossy and very finely punctate between, with single larger punctures in the area between the antennal insertion and the upper eye lobe particularly; lower eye lobes squarish, distinctly longer than genae; genae impunctate, with yellowish hairs below lower eye lobes.
Antennae: Brown, about long as body, scape cylindrical, distinctly thickened in middle; distinctly brownish tomentose; 4th antennomere the longest; ratio for antennomeres: 0.51/ 0.15/ 0.84/ 1.00/ 0.70/ 0.67/ 0.59/ 0.49/ 0.43/ 0.35/ 0.39.
Pronotum: Brown, length-width (middle) ratio: 0.8; base without margin, lateral margin regularly rounded; impunctate on narrow basal and apical strip, otherwise uniformly and less roughly punctate, inter-punctational distances slightly wider than their diameters; surface dull, shagreened and with dense adpressed brownish tomentum.
Elytra: Brown; parallel-sided, straightened from the posterior third; length-base width ratio: 2.6; ratio base width-pronotal width: 1.2; distinctly punctate in rows, which are absent apically, irregularly punctate around the scutellum; surface dull, dense adpressed brownish tomentose; the 7th punctured interstice with a large distinctly yellowish-ochre macula, slightly behind middle, furthermore with single, small white tomentose maculae (see Plate 147 fig. 3), two maculae in the basal half (3rd and 8th interstices) and one apical macula (3rd interstice) more distinct; scutellum wider than long, posteriorly rounded, yellowish tomentose; apex acuminate (wide triangularly), obliquely truncate inwards; epipleura slender, but very slender at elytral apex.
Legs: Brown, with adpressed whitish hairs; femora thickened at middle, profemur stouter; protibia slightly arcuate, distinctly thickened at apical half; mesotibia almost straight, apically with distinct groove, these with thick stramineous hairs; metatibia straight, apically with short stramineous spiny crest; tarsus short, with sparse, greyish hairs; 1st and 2nd tarsomeres of almost same length, 3rd tarsomere slightly longer; claws about long as remaining tarsomeres together.
Ventral side: Brown, light brownish to whitish tomentose, hind borders of sternites lighter tomentose; metepimera, metepisterna and edges of the metacoxa with rough punctures;
Genitalia: aedeagus slender and parallel-sided, apex triangularly narrowed (Plate 147 figs 6-7); tegmen (Plate 147 fig. 5); 8th tergite (Plate 147 fig. 4); fibula (Plate 147 figs 8-10) with a distinct acuminate extension in lateral view.
Range of variation: There is a variation in the number, size and colour (whitish to yellowish) of the small white elytral maculae. Specimens from Mindanao (see above) with the abbreviated labels of “det. cf.” correspond well with the neotype of this species except they have a yellowish elytral macula. The tomentum on the pronotum can be uniformly brownish (neotype) or on each side of disc there is a yellowish annular macule (see Plate 147 fig. 11). The acuminate extension at the fibula (lateral view) may be more distinct like in a male from Mindanao (see Plate 147 fig. 10).
Distribution: *S. ochreoguttata* is distributed on the Philippine islands of Luzon and Mindanao.





6. New synonymies and combinations

***Sybra baculina* Bates, 1866: 352** (Plate 148 figs 1-3)
Sybra ishigakii Breuning et Ohbayashi, 1964: 28 **syn. nov.** (Plate 148 figs 2-3)
Atimura fulva Schwarzer, 1925: 145 **syn. nov.**
Sybra fulva Holzschuh et Lin, 2015: 106

Type material: *Sybra baculina* HT ♀ MNHN: Sybra / baculina / Bates / Formosa [all handwritten] // TYPUS [red label], condition: poorly preserved, tomentum partly rubbed, left protarsus and left antenna missing, left mesotarsus without claw, body size: 5.5 mm; *Sybra ishigakii* colour photograph of the HT (EUMJ): Takeda, Is. Ishigaki / 3, V. 1963 / Y. Arita leg // Holotype [red label] // Sybra / ishigaki / mihi Typ / Breuning dèt., condition: well preserved; *Sybra ishigakii* PT ♀ ISNB: Coll. R. I. Sc. N. B. / Japon: [affixed] Takeda, Is. Ishigaki / 3, V.1963 / Y. Arita leg. // Sybra / ishigakii / Breun. et. Ohb. / Breuning det. [affixed on white card] cf. Bull. Japan Ent. / Acad. 1964, 1, 6: 28 [further affixed label] Para- / type [red label, printed], condition: left mesotarsus without claw, left antenna, right mesotibia and -tarsus are glued beside the specimen, body size: 4.1 mm; *Atimura fulva* colour photograph of the HT ♀ SDEI (see also Holzschuh & Lin 2015).
Additional material (4 spms): 1♀ CYR: Japan Ishigaki Isl., Mt. Nosoko, 8.-9.July 2006, IY; 1♂ CWW: Japan Ishigaki Isl., Kabira, 11.-12. July 2006, IY; 1♀ ZSM: Japan, Prefecture: Okinawa, Iromote Island, 1.VI.1974, lgt. Hata, Sybra (Sybra) pascoei ishigakii Breuning & Ohbay. 1964; 1♂ CWW: Japan, Prefecture: Okinawa, Ishigaki Island, Mount Omoto, 27.VI.1987.

Examination of the HT (EUMJ) and a female PT (ISNB) of *S. ishigakii* has shown that this species is conspecific with *S. baculina*, based on external morphological features. A colour photograph of the female HT of *Atimura fulva* confirms that this species also agrees well with *S. baculina*, and we consider to be also conspecific.

It was noticed during the study of species closely related to *S. baculina* that this species was obviously misinterpreted. Hubweber et al. (2010), among others, place *S. ishigakii* as a subspecific taxon to *S. pascoei* Lameere, 1893. The same holds true for *S. okinawana* Breuning et Ohbayashi, 1967 and *S. pascoei taiwanella* Gressitt, 1951. However these taxa are associated with *S. baculina* or even conspecific with this species. Currently, no clarification is possible. Several times the first author of this work obtained material from Japan determined as *S. baculina* which in reality belongs to *S. mimogeminata* Breuning et Ohbayashi, 1964. Obviously Hayashi (1972) misinterpreted *S. baculina* because he placed six taxa as subspecific to *S. baculina* (*miyakoana* Hayashi 1972, *omoro* Hayashi, 1972, *nipponensis* Hayashi, 1972, *musashinoi* Breuning et Chûjô, 1790, *carinatipennis* Breuning et Chûjô, 1970, *oshimana* Breuning, 1958). Those taxa are related to *S. mimogeminata* or *S. pascoei* but their current status needs clarification. Furthermore Hayashi (1972) places *S. mimogeminata* as a subspecies of *S. baculina*. With regard to *S. baculina,* these two species (*S. mimogeminata* and *S. pascoei*) are distinctly different. Moreover, according to Breuning (1964a) and also Hubweber et al. (2010), *S. maculiclunis* Matsushita, 1931 and *S. baculina* are conspecific. Certainly *S. maculiclunis* (according to a colour photograph of the HT) is associated with *S. posticalis* Pascoe, 1858 or both are even conspecific. A reliable decision can only be determined through the study of type material. There has been great confusion in the literature in recent decades within this species complex, and the study of the type material is essential.

***Sybra borneotica* Breuning, 1939: 256** (Plate 148 figs 4-5)
Apomecyna borneotica Breuning, 1982: 142 **syn. nov.**

Type material: *Sybra borneotica* HT ♀ BMNH: Borneo Kina Balu // Fry Coll. / 1905.100. // Sybra / borneotica / mihi Typ / det. Breuning // Type.
Condition of the HT: Tomentum almost completely rubbed, left antenna with 6 antennomeres and right antenna with only one antennomere, body size: 7.5 mm; *Apomecyna borneotica* colour photograph from the HT (EUMJ): (BORNEO IS.) / Poling nr. Ranau / Sabah, Malaysia. / 27.IV.1980 / M. & A. Sakal // TYPE [red label] // Apomecyna / borneotica [green, both handwritten] / Breuning dèt. // Apomecyna / borneotica nov. [printed]. condition: well preserved.
Additional material (30 spms): 1♂ CMI: Bukit Soeharto, Kalimantan Timur, Indonesia, 08.III.1999, H. Makihara leg., LIGHT TRAP 60-0; 1♂ CSH: Bukit Soeharto, Kalimantan Timur, Indonesia, 29.VII.1999, H. Makihara leg., *Artocarpus* sp., Tower 30m; 1♀ CMI: Bukit Soeharto, Kalimantan Timur, Indonesia, 22.III.2000, H. Makihara Leg., Artocarpus sp.; 1 cf. ♀ CMI: Kutai National Park, E. Kalimantan, 10-12.ix. 2000, Sugiarto leg.; 1♂ CSH (Plate 148 fig. 5): Fog A62/F2, 20.I.1993, IF, body size: 8.6 mm; 2♂ JMU: Bergil, My [Malaysia] SW3 N6,17.204, E116 42.305, *V. pinnata*, B8 F2, IF 10.3.1997; 1♀ JMU: Poring Hot Springs, My [Malaysia], N6 03.458, E116 42.208, *Xanthophyllum tenue* 3, IF, 09.08.2009; 1♀ JMU: Kinabalu Park, 6°5'N, 116°33'E, Sorinsim III, 40yr, Bergil 10, 8.3.97, IF; 1♂ JMU: Kinabalu Park, 6°5'N, 116°33'E, Sorinsim III, 40yr, Bergil 4,






6.3.97, IF; 2♂, 1♀ CSH & JMU: same, Bergil 1, 5.3.97, IF; 1♂ & 3♀ JMU: same, Bergil 6, 7.3.97, IF; 1♂ JMU: same, Bergil 5, 7.3.97, IF; 3♂ & 1♀ CSH & JMU: same, Bergil 8, 8.3.97, IF; 1♂ & 4♀ JMU: same, Sorinsim SW II, 15Years, Bergil 9, 2.3.97, IF; 1♂ JMU: Kinabalu, PHS Garden, 6°5'N, 116°3'E, MY [Malaysia], *Nephelium lappaceum*, IF, 22.2.(20)01. 1♂ CSH: Kinabalu Park, Sorinsim SW I, 5Years, Bergil 11, 12.3.97, IF; 1♀ JMU: Kinabalu Park,Sorinsim SW II, 15Years, Bergil 8, 2.3.97, IF.

Remarks: The examination of the female type specimen of *S. borneotica* and the comparison with the colour photograph of the HT of *A. borneotica* has shown the two species are conspecific. Therefore *A. borneotica* is a junior synonym of *S. borneotica*. *S. borneotica* is related to *S. inanis* Pascoe, 1865 (see also Weigel & Skale 2011). Based on external morphology this species group is very uniform; species can be differentiated by their unique fibula.

Sybra fuscovittipennis Breuning, 1975: 161
Sybra baloghi Breuning, 1975: 162 **syn. nov.**

Type material: *Sybra fuscovittipennis* HT ♀ HNHM: NEW GUINEA NE / Baiyer River Sanctuary / 1-5.IX.1969. / No. NGB-U.22. / leg. Dr. J. Balogh // Holotypus 1974 / Sybra / fuscovittipennis Breuning // HOLOTYPE // Sybra / fuscovittipennis / mihi Typ / Breuning dèt., condition: tomentum well preserved, right antenna with 8 antennomeres, right middle leg without claw, body size: 5 mm; *Sybra baloghi* HT ♀ HNHM: NEW GUINEA NE / Baiyer River Sanctuary / 1-5.IX.1969. / No. NGB-U.22. / leg. Dr. J. Balogh // Holotypus 1974 / Sybra / baloghi Breuning // HOLOTYPE // Sybra / baloghi / mihi Typ / Breuning dèt., condition: well preserved, right antenna with 10 antennomeres, body size: 6.5 mm.

Remarks: The examination of both holotype specimens in the HNHM by the co-author has shown both species are morphologically not differentiated and are therefore conspecific. Consequently *S. baloghi* is a junior synonym of *S. fuscovittipennis*. This is again an important example of insufficient examination of collection material by Breuning. He described two species using almost the same text, from two specimens from the same locality, collected on the same dates, and published them immediately next to each other.

Sybra latiuscula Aurivillius, 1927: 23 (Weigel & Skale 2011)
Sybra guamensis Iwata, 1993: 151 **syn. nov.** [nec Breuning: 1976] (Plate 148 figs 6-7)

Type material: *Sybra latiuscula* LECTOTYPUS ♂ USNM: Island Sibuyan / Baker // 8635 [handwritten] // Typus [printed] // 181 [printed] // Sybra / latiuscula / Auriv'27 Auriv [handwritten] // BLNO 000976 [light blue, printed] // LECTOTYPUS / Sybra / latiuscula / Aurivillius, 1927 / des. Skale & Weigel 2011, condition: tomentum somewhat damaged, left protarsus without claw, body size: 12.8 mm; *Sybra guamensis* PTs 1♂ & 1♀ NUK (Plate 148 figs 6-7): Tumon Beach / Guam, USA / 1991. XII.22 / leg. R. Iwata // [PARATYPE] / Sybra (s.str.) / guamensis / IWATA, 1992 ♂ or ♀ // Sybra / latiuscula / Aurivillius, 1927 / rev. Skale & Weigel, 2013.
Additional material (see also Weigel & Skale 2011) (19 spms): 2♂ & 2♀ CZW: Philippinen: Luzon, Cam. Sur, Lupi Sooc, at light, 9.-15.3.2004, leg. Zettel & Pangantihon (379); 1♀ CZW: Philippines: Cebu City Talamban, USC 22.3.2006, leg. C. Pangantihon (P221); 1♀ CZW: Philippinen: Carnarines Sur, Lupi, Sooc 29.2.2004, leg. C. Pangantihon (P48); 1♂ CZW: Philippinen: Batangas Bauan, San Pedro 21.5.2004, leg. C. Pangantihon (P98); 1♂ CZW: Philippinen: S. Luzon Camarines Sur, Lupi Sooc, 26-28.4.2008, leg. C. Pangantihon (P235); 1♀ CZW: Philippinen: Luzon, Camarines Sur, N Sipocot Sooc, 18.-22.2.2001 leg. H. Zettel (273); 1♀ CZW: Philippinen : Luzon, Cam. Sur, Lupi Sooc, 18-23.2.2004, leg. H. Zettel & C. Pangantihon (374); 1♂ CZW: Philippinen: Luzon, Camarines Sur, Lupi Sooc, Lichtfang, 10.2.2003, leg. H.Zettel (336); 1♂ CZW: Philippinen: Luzon, Camarines Sur, Lupi, Sooc, village, at light etc., 6.-11.3.2006 leg. H. Zettel (441); 1♂ & 1♀ CZW: Philippines: Camarines Sur Lupi, Sooc, light trap 7.12.2009, leg. C. Pangantihon (P343); 1♂ CZW: Philippinen: Camarines Sur, Lupi, Sooc, 25.-27.3.2004, leg. C. Pangantihon (P64); 1♂ CZW: Philippines: Camarines Sur Lupi, Sooc light trap 100m , 22.-27.2.2008 leg. H. Zettel (511); 1♀ SMF: Mt. Isarog Luzon; 1♂ & 1♀ CTO: APR 2013: Philippines Central Visayas col. Ismael Negros.

Remarks: The HT ♂ (NSMT, with data: GUAM, Tumon Beach, 22 Dec 1991, R. Iwata) couldn't be examined but comes from the same sampling as the referenced paratypes (Iwata 1993). The studied paratypes of *S. guamensis* correspond with *S. latiuscula* in all morphological features. Furthermore, a study of male genitalia, and additionally, the comparison with material of *S. latiuscula* from the Philippines (Luzon) has confirmed the synonomy of both. Therefore *S. guamensis* is a junior synonym of *S. latiuscula*. Certainly Iwata (1993) was not aware of *S. latiuscula* because of its former synonymy with *S. alternans* (Wiedemann, 1823).

Sybra marcida Pascoe, 1865: 200 (Plate 149 figs 1-5)
Sybra intorta Breuning, 1939: 247 **syn. nov.**
Sybra papuana Breuning, 1939: 247 **syn. nov.** (Plate 149 fig. 2)
Sybra pseudogeminata Breuning, 1939: 247 **syn. nov.**






Type material: *Sybra marcida* HT ♂ BMNH: Sybra marcida, Pasc. Sylee [handwritten] / Pascoe Coll. 93-6 [printed on underside] // Saylee [blue, oval-shaped label] // Type [white label with red border] // Sybra marcida Type Pasc [handwritten], condition: well preserved, only the tomentum slightly rubbed, body size: 7 mm; *Sybra papuana* HT ♀ BMNH: N. Guin Moari. [Mt. Moari near Oransbari in the Arfak Mountains] [handwritten] // Sybra papuana mihi Typ det. Breuning // Fry Coll. 1905.100. // 21223 [handwritten] // Type [round label with red borders], condition: well preserved, only the right metatarsus is lost, body size: 7.5 mm; *Sybra intorta* HT (BMNH) from the type locality: W-Papua: Dorey; *Sybra pseudogeminata* HT (BMNH) from the type locality: W-Papua: Geelvinck Bay.

Additional material (12 spms): WESTERN PAPUA: 1♀ CWW: W-PAPUA Manokwari Pr. Manokwari, Gunung Meja Reserve, 200m, 0°50''4'S, 134°04''4'E, 01.III.2007, IW, prim. Forest [spm compared with the HT of *S. intorta* in the BMNH]; 1♂ & 1♀ CSH: W-Papua Manokwari Pr., vic. Mokwam (Siyoubrig), 1400-1800 m, 01°06'26"S, 134°51'41"E, 24.-28.II.2007, IS; 2♂ & 1♀ CSH: W-PAPUA, Manokwari Prov., 18 km NE Ransiki, Oransbari, 01°21.05'S 134°12.46'E, 02.-06.III.2007, cutting area, IS; 1♂ CWW: W-PAPUA, Manokwari Pr., 14 km NE Ransiki, Warbiati (Oransbari), 01°18.25'S, 134°14.14'E, 02.III.2007, cutting area, IW; 1♂ CWW: W-PAPUA, Manokwari Prov., 6 km N Manokwari, Desa Pami, 160 m, 0°48.34'S, 134°03.15'E, 09.III.2007, IW; 1♀ CMS: INDONESIA, Oriental Yapen Is., 20km W Serui, Dec. 2006, O. Mehl leg., Yapen Serui and vic., 01.52.114 S, 136.14.189 E; 1♂ CMS: INDONESIA Or., Yapen Is., 30 km NE Serui, Dec. 2006, O. Mehl leg., Yapen NE Serui, 01.47.418 S, 136.18.131 E; 1♀ CYR: Duebey Vil., Arafak Mt., Irian Jaya, Indonesia, 10.-15 March 2008, IY; PAPUA NEW GUINEA: 1♂ CWW: PNG: New Ireland b., 5km SW Fangalawa Tesin, 100m, 02°53'22''S, 151°09'46''E, 11.III.2000. Kulturland, IW.

Remarks: The examination of the female HT of *S. papuana* has shown it is conspecific with *S. marcida*. Differences in the tomentum are typical variations of *S. marcida*. Type specimens of both *S. intorta* and *S. pseudogeminata* were studied in the BMNH and compared with *S. marcida* by the first author. As a result, the synonymy of both species with *S. marcida* could be confirmed.

S. marcida has a wide range of variation (see Plate 149 figs 1-3). Furthermore this species is quite different in some morphological features from the genus *Sybra*. In the future, this species should be placed in a separate genus. All tibia are covered with single long whitish hairs, males have a distinct dentate extension slightly above the middle of the internal side of the mesotibia, and the whole endophallus contains a long "cord-shaped" sclerite (Plate 149 fig. 5). An additional species in this group is *Sybra tricoloripennis* Breuning, 1961 from the Indonesian island of Sulawesi.

Sybra mindorensis Aurivillius, 1927: 25 (Plate 148 figs 8-9)

Sybra mindoroensis Breuning, 1964: 246 [misspelling]

Sybra alternans m. *discomaculata* Breuning, 1950: 268 [nomen nudum]

Sybra discomaculata Breuning, 1950 (Breuning 1964b: 309)

Type material: *Sybra mindorensis* HT ♀ NHRS: Calapan / Mindoro // Typus [red label] // 9974 E92 +, condition: tomentum well preserved, right middle leg is missing, body size: 9.3 mm.

Additional material (20 spms): 1♀ CZW: Luzon, Camarines Sur, N Sipocot Sooc, 29.1. - 10.2.2002, var. collectors (305); 1♂ CVB: Philippines, Laguna I., Lumawig leg., S. Luzon, VI-2003; 3♂, 2♀ CZW, CSH & CWW: Philippinen: Luzon, Cam. Sur, Lupi, Sooc, dam area, 14.3.2004, leg. Zettel & C. Pangantihon (380); 3♂ & 1♀ SMF: Vivac, SO. Luzon; 1♀ CZW: Philippinen: Luzon, Camarines Sur, N Sipocot Sooc, 18.- 22.2.2001, leg. H. Zettel (273); 2♂ CZW: Philippinen: Camarines Sur, Lupi, Sooc, dam, 16.3.2004, I. L. Vichozo & C. Pangantihon (P59); 1♂ & 2♀ SMF: Calapan, Mindoro; 1♀ ZSM: Philippines, Negros BV. VII.85, Sybra densemarmorata Br., Hüdepohl det. 1993; 1♀ CZW: Philippines: Cebu, City Talamban, USC 24.1.2006, leg. C. Pangantihon (P217); 1♂ USNM: Surigao, Mindanao, Baker, 172, Sybra sp. Auriv'27.

Remarks: The taxon "*discomaculata*" is not a nomen nudum (see also Weigel & Skale 2016). The suspected synonymy with *S. mindorensis* was confirmed through a colour photograph from the NHRS (kindly provided by L. Dembicky) (see also remarks under *S. ochreovittipennis*). *S. mindorensis* can be easily distinguished from *S. ochreovittipennis* by numerous small white maculae on the elytral surface, four maculae in the 3rd elytral interstice are always particularly distinct. Furthermore, the black elytral macula is bordered by white spots at both sides. *Sybra ochreovittipennis* has only one white macula in the 3rd interstice on the anterior third of the elytron.

Sybra ochreovittipennis Breuning, 1964: 68 (Plate 149 figs 6-8)

Sybra samarana Breuning, 1970: 646 **syn. nov.** (Plate 149 fig. 7)

Type material: *Sybra ochreovittipennis* HT ♀ SMTD: Samar / Borongan / coll. W. Schultze // Coll. W. Schultze / Ankauf 1942 // Staatl. Museum / für Tierkunde /






Dresden // Typus // Sybra / ochreovittipennis / mihi Typ / Breuning det., condition: well preserved, right antenna with 10 antennomeres, body size: 10 mm; *Sybra samarana* HT ♀ MNHN: Samar / VI. VII. [18]96. / J. Whit[e]head. // TYPE // Sybra / samarana / mihi Typ / Breuning dèt., condition: tomentum mostly rubbed off, left antenna missing, right antenna with 4 antennomeres, body size: 9.9 mm; *Sybra alternans discomaculata* HT ♀ (USNM, Plate 149 fig. 8): Philippinen / Leyte ..... // Sybra ♀ / alternans / m. discomaculata mihi / det. Breuning // ♀ TYPE [red label] // BLNO 000961 [blue printed label], condition: tomentum well preserved, right middle leg missing, body size: 9.5 mm.

Additional material (12 spms): 2♂ & 1♀ SMF: Buranen Luzon, Coll. B. Schwarzer; 1♂ DEI: Taelobang, Leyte, Phil., G. Boettcher coll., A, Heyne ded., Dtsch. Entomol. Institut Berlin; 3♀ SMF: Philippinen, Leyte ...., Coll. B. Schwarzer; 1♂ SMNS: Philippines, Leyte, Visca N, Baybay, cultiv. land, 1991, leg. Schawaller & al., 1.3.91, Sybra ochreovittipennis Br., Var.?, Hüdepohl det. 1993; 1♂ SMNS: Philippines, Leyte, Visca N, Baybay, 1991, sec. forest, 100-200 m, leg. Schawaller & al., 21.2.91, Sybra ..... punctata Fish., Hüdepohl det. 1993; 1♀ CZW: Philippinen: Leyte, Baybay, LSU, 50m, Lago-Lago Riv., 19.3.2005, leg. H. Zettel & Pangantihon (421); 1♀ MNHN: Philipp Semper, 1214, Museum Paris, Coll. H. W. Bates, 1952; 1♀ SMF: Cabuntug S iargao, Coll. B. Schwarzer.

Remarks: The taxa *"discomaculata"* is not a nomen nudum (see Weigel & Skale 2016), because it was elevated by Breuning (1964b) to species level (ICZN 1999) (art. 45.6.4.1). The female specimen examined from the USNM is not the holotype of this taxon. According to Breuning (1950), the type material is preserved in NHRS with the following data: HT from Luzon: Mt. Banahao; PTs: Luzon, Ripong, Vivac and Mindanao: Butuan. Therefore, this species could not be verified, however a suitable colour photograph of the HT (NHRS) is available, kindly provided by L. Dembicky (Brno, Czech Republic) (see also under *S. mindorensis*). The label data of this supposed HT from the USNM coincides exactly with three female specimens preserved in SMF. Probably this specimen was acquired from SMF and later labelled as holotype. Furthermore Breuning's original label with the designation for a holotype is missing.

After morphological examinations, the poorly preserved HT of *S. samarana* (MNHN), the *"discomaculata"* specimen designated by Breuning as HT (USNM) and the HT of *S. ochreovittipennis* (SMTD) correspond to each other. All three examined specimens are conspecific, subsequently *S. samarana* is a junior synonym of *S. ochreovittipennis*.

S. ochreovittipennis belongs to the *Sybra alternans*-group (see also Weigel & Skale 2016) distributed with numerous species on the Philippine Islands, all of them very difficult to differentiate.

Sybra porcellus Pascoe, 1865: 211 (Weigel & Skale 2011) (Plate 149 fig. 9, plate 150 fig. 1)
Sybra obliquevittata Breuning, 1939: 258
Sybra proximata Breuning, 1942: 149 **syn. nov.** (Plate 149 fig. 9)
Sybra proximatoides Breuning, 1966: 258
Sybra submodesta Breuning, 1970: 646

Type material: *Sybra porcellus* HT ♀ BMNH: see also Weigel & Skale 2011; *Sybra proximata* HT ♂ BMNH: Type [white label with red borders] // N.W. Borneo / 95-226 // Sybra / proximata / mihi Typ / det. Breuning [handwritten], condition: tomentum well preserved, left antenna with 7 antennomeres, left pro- and metatarsus without claws, right protarsus only with one tarsomere, body size: 12 mm.

Additional material (see also Weigel & Skale 2011) (21 spms): PHILIPPINES: 1♂ CSH: PHILIPPINEN, Kayapa, Nueva Vizcaya Prov., Loc. Coll., 10.2010; 1♂ CVB: Philippinen-N, Sierra Madre, loc. Collector, Aurora – Luzon, VII.2008; 1 spm (SMF): Vivac S.O. Luzon, Coll. B. Schwarzer; 2 spms SMF: Arorey Philippin., Coll. B. Schwarzer; 2 spms (SMF): Pt Bango Mindanao, Coll. B. Schwarzer; 1 spm SMF: Tabaco S, O Luzon, Coll. B. Schwarzer; 2 spms SMF: Buranen, Luzon, Coll. B. Schwarzer; 1♀ SMF: N. Palawan, Binaluan, Nov.-Dez. 1913, leg. G. Boettcher, Coll. B. Schwarzer; 1♀ SMF: N. Palawan, Bacuit, Dezember 1913, leg. G. Boettcher, Coll. B. Schwarzer; 1 spm SMF: Basilan, Philippin., Coll. B. Schwarzer; SULAWESI: 1♂ (Plate 150 fig. 1, body size: 10.2 mm) & 1♀ CWW: INDONESIA N-Sulawesi 1 km W Toraut, Dumoga Bone NP 200-300m, 0°34'17''N, 123°54'19''E 02.II.2006, IW; 1♂ CSH: INDONESIA N Sulawesi, 1 km W Toraut, 200m, 0°33'49''N, 123°54'38''E, 02.II.2006, IS, clearing at riverside; 1♂ BMNH: INDONESIA: SULAWESI UTARA, Dumoga-Bone N.P., December 1985, R. Ent. Soc. Lond. PROJECT WALLACE, B.M. 1985-10, Fog 26, 230m, 2.xii. 85, BMNH Plot A, TRAY 83; 1♂ BMNH: same data, 14-21 August 1985, Plot B, ca 300m Lowland forest, Malaise trap up tree; 1 spm BMNH: same data, July 1985, Fog 13, 230m, 11.vii. 85, BMNH, Plot A, TRAY 105; 1 spm BMNH: same data, TRAY 91; 1 spm BMNH: same data, TRAY 106; 1 spm BMNH: same data, TRAY 1116.

Remarks: Based upon external morphological features, both species *S. porcellus* and *S. proximata* agree with each other, subsequently we consider them conspecific. Therefore *S. proximata* is a junior synonym of *S. porcellus*. Because of the fragile condition of the type specimen of *S. proximata,* the genitalia were not examined.






***Sybra sexguttata* Breuning, 1939: 259** (Plate 150 figs 2-3)
Sybra postalbomarmorata Breuning, 1964: 68 **syn. nov.** (Plate 150 fig. 3)

Type material: *Sybra sexguttata* HT ♂ BMNH: Type [round, white label with red borders) // Philippines: Mindanao / Davao C.F.Baker. // Brit. Mus. 1924– 486 // 6734 // Sybra / sexguttata / mihi Typ / det. Breuning., condition: tomentum well preserved, right middle leg is missing and both antennae with only 10 antennomeres, body size: 10.5 mm; *Sybra postalbomarmorata* HT ♂ SMTD: Mindanao, Davao / Davao / coll. W. Schultze // Typus // Coll. W. Schultze / Ankauf 1942 // Staatl. Museum für / Tierkunde, Dresden // Sybra post- / albomarmorata / mihi Typ / Breuning det., condition: tomentum not well preserved, right metatarsus with only 2 tarsomeres, body size: 9.5 mm.
Additional material: PT ♀ MNHN: Mindanao, Davao., Sybra 6 – guttata mihi Paratyp [handwritten] det. Breuning, PARATYPE, condition: tomentum strong rubbed, both posterior legs missing, body size: 10 mm. This examined paratype specimen does not belong to the type series. Breuning (1939) described *S. sexguttata* from one specimen (BMNH) only.

Remarks: *S. sexguttata* belongs to the *Sybra incana* group (Skale & Weigel 2014). Numerous species of this group occur in the Philippines, which are very similar externally and the differentiation is difficult. Based on examinations of the mentioned type material, we consider both species to be conspecific, consequently *S. postalbomarmorata* is a junior synonym of *S. sexguttata*.

***Falsepilysta ochraceomaculata* (Schwarzer, 1931)** (Plate 150 figs 4-5)
Plocia ochraceomaculata Schwarzer, 1931: 73
Falsepilysta ochraceomaculata Breuning. 1960: 139
Falsepilysta vitticollis Breuning, 1940: 427 (Breuning 1949: 20)
Inermomulciber schultzei Breuning, 1974: 39 (Homonoeini) **syn. nov.** (Plate 150 fig. 5)
Plocia affinis (Breuning & Villiers, 1983) **syn. nov.**
Mimoplocia affinis Breuning et Villiers, 1983: 15
Plocia affinis Tavakilian et Jiroux, 2015: 78

Type material: *Falsepilysta ochraceomaculata* HT ♀ SMF: Mt. Polis / Luzon / / Typus [red label with black borders] / Col. 133 [at underside] // Plocia / ochraceomaculata / det. Schwarzer 1930 Schwarzer / Typus ! [cross ahead], condition: left antenna with 8 and right antenna with 3 antennomeres, right protarsus without claw, left metatarsus with only one tarsomere, body size: 14.1 mm; PT ♀ SMF: Hightsplan / Luzon / / Para- / typus [red label with black borders] / Col. 133G [at underside] // Plocia / ochraceomaculata / det. Schwarzer 1930 / Para-/ typus ! [cross ahead], condition: completely preserved, body size: 13.2 mm; *Inermomulciber schultzei* HT ♂ SNSD: Luzon / Benguet / Mt. Pawai, 2400m / coll. W. Schultze // coll. W. Schultze / Ankauf 1942 // Plocia n. sp. / det. W. Schultze. / TYPE [red label] / Staatl. Museum für / Tierkunde, Dresden // Inermomulciber / schultzei mihi Typ / Breuning dèt., condition: completely preserved, body size: 11.4 mm; *Inermomulciber schultzei* PT ♂ SNSD: Luzon / Benguet / Mt. Pawai, 2400m / coll. W. Schultze // coll. W. Schultze / Ankauf 1942 // PARATYPE [red label] / Staatl. Museum für / Tierkunde, Dresden // Inermomulciber / schultzei mihi Paratyp / Breuning dèt., condition: left antenna with 9 and right antenna with 6 antennomeres, body size: 11.8 mm; *Plocia affinis* colour photograph of the HT ♂ MNHN from the type locality: Philippines, Luzon, Mt. Data.
Additional material: 1♂ SMTD: Luzon, Isabela, Mt. Moises, coll. W. Schultze, Coll. W. Schultze, Ankauf 1942, Staatl. Museum für Tierkunde, Dresden.

Remarks: Examination of the above mentioned type material consisting of 3 HTs and 2 PTs results in all three species being considered conspecific. Therefore *I. schultzei* and *M. affinis* are junior synonyms of *F. ochraceomaculata*. This is another significant example of confusion caused by Breuning in the tribe Apomecynini.

***Falsepilysta olivacea* (Schwarzer, 1931)** (Plate 150 figs 6-7)
Epilysta olivacea Schwarzer, 1931: 76
Mimosybra albosignata Breuning, 1982: 142 **syn. nov.** (Plate 150 fig. 7)

Type material: *Falsepilysta olivacea* HT ♂ SMF: Philippinen / Montalban / O. Schultze // Typus [red label with black borders] / Col. 136 [at underside] // Epilysta / olivacea Schwarzer / det. Schwarzer 1930 / Typus ! [written crosswise], condition: well preserved, left antenna with only 3 antennomeres, body size: 11 mm; *Falsepilysta olivacea* PT ♀ SMF: Philippinen / Montalban / O. Schultze // Para- / typus [red label with black borders] / Col. 136a [at underside] // Epilysta / olivacea Schwarzer / det. Schwarzer 1930 / Para- / typus ! [cross ahead], condition: completely preserved, body size: 11.7 mm; *Falsepilysta olivacea* PT ♀ SMF: Philippinen / Montalban / O. Schultze // Epilysta / olivacea Schwarzer / det. Schwarzer 1930 / Para- / typus ! [written crosswise], condition: well preserved, left antenna with 9 antennomeres, body size: 10.2 mm; *Mimosybra albosignata* colour photograph of the HT EUMJ: PHILIPPINES / Mt. Data, 2300m / Bontoc Prov., Luzon / June, 7-9, 1977 / M. Sato leg. // TYPE [red label] // Mimosybra / albosignata / Breuning dèt Typ // Mimosybra / albosignata / sp. nov. / Det. by Breuning






1982, condition: well preserved, left metatarsus only lacking claw.
Additional material: 1♀ SMF: Hightsplan, N-Luzon, coll. N. Schwarzer.

Remarks: A comparison of the type material has shown that the two species are conspecific, subsequently *M. albosignata* is a junior synonym of *F. olivacea*.

***Mimosybra annulata* (Heller, 1924) comb. nov.**
(Plate 150 figs 8-9)
Atelais (?) *annulata* Heller, 1924: 210, 212
Sybra annulata Breuning, 1960: 147

Type material: *Atelais* (?) *annulata* HT ♀ SMTD: Zamboanga / Mindanao /Baker // Orinoeme / annulata [handwritten] / typus [red label] // Staatl. Museum für / Tierkunde, Dresden, condition: left middle leg and left antenna missing, right antenna with only one antennomere, body size: 12.9 mm.
Additional material (4 spms): 1♀ CVB: Philippinen, Calayan isl., l. Lumawig leg., XII.2003; 1 spm (CVB): C3683 / Impasung-ong / Bukidnon / 31 May-2 Jun 03; 1♂ CWW (Plate 150 fig. 9): Philippinen, Mindanao, Surigao Mts., I-2011, local collector, body size: 11.8 mm; 1♂ SMTD: Luzon, Rizal, Montalban, coll. W. Schultze, Coll. W. Schultze, Ankauf 1942, Staatl. Museum für Tierkunde, Dresden.

Remarks: This species belongs to the genus *Mimosybra* Breuning, 1939 due to morphological features. Certainly the spiny extension in the middle of the internal side of the mesotibia, a characteristic feature for this genus (see also Skale & Weigel 2014), is less distinct in this species. There is only a small extension visible.

***Mimosybra bimaculata* (Breuning, 1939) comb. nov.** (Plate 151 figs 1-2)
Sybra bimaculata Breuning, 1939: 252

Type material: HT ♀ BMNH: PHILLIPINES: / Mindanao, / Davao / C. F. Baker. // 6788 // Brit. Mus. 1924 – 486. // Type [round label with red border] // Sybra / bimaculata / mihi Typ [handwritten] / det. Breuning, condition. right middle leg missing, left antenna with nine antennomeres only, body size: 11.7 mm.
Additional material (3 spms): 2♂ SMF & CWW: Imugan, Luzon, coll. B. Schwarzer, body size: 8.2 mm / 8.1 mm; 1♂ CWW (Plate 151 fig. 2): INDONESIA: Sulawesi bor., 2 km NW Tomohon, bottom of Mt. Lokon, 830-850m, 1°21'29"N / 124°487'57"E, 30.I.2004, leg. A. Weigel, body size: 8.7 mm.

Remarks: This species belongs to the genus *Mimosybra* Breuning, 1939 due to morphological features, especially the spiny extension in the middle of the internal side of the mesotibia (mentioned in Skale & Weigel 2014). The type specimen (female) has an indistinct spiny extension of the mesotibia only.

***Mimosybra biplagiata* (Breuning, 1939) comb. nov.**
Ichthyodes (*Orinoeme*) *biplagiata* Breuning, 1939: 288

Type material: *Ichthyodes biplagiata*: colour photograph of the HT ♂ BMNH from the type locality: Philippines, Luzon, Cap Engano.
Additional material: colour photograph of an incorrectly labelled PT ♂ NHMB, N-Luzon; 1♂ CWW: N-Philippinen, Sierra Madre, Aurora, VII.2007, local collector.

Remarks: This species belongs to the genus *Mimosybra* Breuning, 1939 due to morphological features, especially the spiny extension in the middle of the internal side of the mesotibia (mentioned in Skale & Weigel 2014). The PT deposited in the NHMB does not belong to the type material. The labelling was obviously made later. Breuning (1939) described this species based on one male only.

***Mimosybra borneana* (Breuning, 1961) comb. nov.** (Plate 151 fig. 3)
Parepilysta (*Spinepilysta*) *borneana* Breuning, 1961: 152

Type material: *Mimosybra borneana* colour photograph of the HT NHMB from the type locality: Northern Borneo.
Additional material (6 spms): 1 spm SNSD: Borneo, Gehr. W. Müller, Vermächt. 1909, Staatl. Museum für Tierkunde, Dresden, Sybra discomaculata Breun., Breuning dèt.; 2 spms CHH: Malaysia, Sabah, Ranau, IV-I-2006, III-10-2006, local coll.; 1♂ CWW: Malaysia, Sabah, Ranau, 06.II.2007, local coll.; 1 ♂ (Plate 151 fig. 3, body size: 14 mm), 1♀ CWW: Mt. Trus Madi, 02.IV.2001, 24.V.2006, local coll; 1♂ CWW: Kinabalu NP, My PW, N6 02.903, E116 41.953, A. Lagneocarpa 10 F1, IF, 29.3. 1997.

Remarks: This species belongs to the genus *Mimosybra* Breuning, 1939 due to morphological features, especially the spiny extension in the middle of the internal side of the mesotibia (mentioned in Skale & Weigel 2014).






***Mimosybra schultzei* (Breuning, 1966)** (Skale & Weigel 2012)
Pseudichthyodes schultzei Breuning, 1966: 123
Sybra mimalternans Breuning, 1970: 646 **syn. nov.**
Mimosybra alternans Breuning, 1973: 648 **syn. nov.**

Type material: *Sybra mimalternans* colour photograph of the HT (MNHN) from the type locality: Philippines, Samar island; *Mimosybra alternans* colour photograph of the HT (MNHN) from the type locality: Philippines, no more data.
Additional material (3 spms): 1♂ ZSM: Philippinen, Mimosybra alternans det. Hüdepohl 1993; 1♀ SMTD: Philippinen, Semper, Tausch 1972, Dr. Breuning, Staatl. Museum für Tierkunde, Dresden; 1♂ CWW: N-Philippinen, Luzon, Bondoc Peninsula, X.2011, local collector.

Remarks: Based on the available colour photographs of both HTs specimens, *S. mimalternans* and *M. alternans,* and the examination of additional material, we consider both species to be conspecific with *M. schultzei*. An image of this species is shown in Skale & Weigel (2012).

***Mimosybra strandi* (Breuning, 1939) comb. nov.**
(Plate 151 figs 4-6)
Neosybra strandi Breuning, 1939: 278

Type material: *Neosybra strandi* HT ♀ USNM: Buso ? [handwritten, unreadable] // TYPE [red label] // Neosybra / strandi / mihi Typ / det. Breuning // BLNO / 000681 [light blue label], condition: tomentum very poorly preserved, right antenna with 10 antennomeres, right mesotibia and -tarsus missing, body size: 12 mm.
Additional material (3 spms): 2♂ & 1♀ CWW: Taiwan, Taitung, Lanyu, Hsiaotienchih, 2013, IV-14, Y-T Chung Leg., CCCC, body size: 14-15.5 mm.

Remarks: The HT specimen (USNM) was in very bad condition, almost completely dirty and sticky without any tomentum visible. After cleaning and preparation it could be compared with fresh material obtained from Taiwan (our cordial thanks to Mr. C. Holzschuh for providing fresh material). The last time a sizeable number of specimens were found was in Taiwan (Lanyu Island), which is probably the origin of this species. Because of the bad handwritten label (Plate 151 fig. 5) the type locality is not clear. Breuning (1939) interpreted the type locality as "Borneo", a likely incorrect origin.
This species belongs to the genus *Mimosybra* Breuning, 1939 due to morphological features especially the spiny extension in the middle of the internal side of the mesotibia (mentioned in Skale & Weigel 2014).

Corrections

Because of homonymy, we provided a new name for *Mimosybra luzonica* Breuning, 1957 in Skale & Weigel (2012). This was unnecessary because *Sybra medioflavomaculata* Breuning, 1966 is an available name for this taxon, therefore:

Sybra medioflavomaculata Breuning, 1966
= *Sybra lingafelteri* Skale et Weigel, 2012 **syn. nov.**

In Skale & Weigel (2014) we omitted to explain the abbreviation "NME" used in the description of *Sybra yokoi* Skale et Weigel, 2014. NME – Naturkundemuseum Erfurt, Germany.

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The *Eudocima* Billberg, 1820 of the Australian Region (Lepidoptera: Erebidae: Calpinae)

Alberto Zilli [1], **Vernon A. Brou** [2], **Crystal Klem** [3], **Jennifer Zaspel** [4]

1 – *Corresponding author:* Natural History Museum, Life Sciences, Cromwell Road, SW7 5BD, London, United Kingdom; e-mail: a.zilli@nhm.ac.uk
2 – 74320 Jack Loyd Road, LA 70420, Abita Springs, U.S.A.; e-mail: vabrou@bellsouth.net
3 – Department of Entomology, Purdue University, 901 W State Street, IN 47907, West Lafayette, U.S.A.; e-mail: cklem@purdue.edu
4 – Milwaukee Public Museum, Zoology, 800 W Wells Street, WI 53233, Milwaukee, U.S.A.; e-mail: zaspelj@mpm.edu

Abstract: An annotated checklist of all species of *Eudocima* occurring from Wallacea to the Australian zoogeographical region is provided. Three species are described as new to science, *E. oliveri* sp. nov. (Vanuatu), *E. martini* sp. nov. (Solomon Archipelago) and *E. steppingstonia* sp. nov. (Marquesas Is). The following synonymies are established: *Ophideres caesar* C. Felder, 1861 = *Othreis prattorum* A.E. Prout, 1922 syn. nov. and *Ophideres kuehni* Pagenstecher, 1886 = *Lagoptera pratti* Bethune-Baker, 1906 syn. rev. *Eudocima talboti* (A.E. Prout, 1922) stat. rev. is resurrected to species level. Lectotypes for *Ophideres plana* Walker, [1858] and *Phalaena Noctua cajeta* Cramer, [1775] are also designated.

Key words: Fruit-piercing moths, review, new species, Wallacea, Pacific.

Introduction

The genus *Eudocima* Billberg, 1820 (Erebidae: Calpinae) consists of several large-sized species of fruit piercing moths distributed in tropical regions of the world, such as the well-known orchard pest *E. phalonia* (Linnaeus, 1763); a few taxa also extend to the temperate regions. Recently, descriptions of four new species, and a checklist of the genus was provided by Zilli & Hogenes (2002). Subsequently, as part of a world checklist of the then tribe Calpini, a revised list of the genus *Eudocima* was published by Zaspel & Branham (2008). Several taxonomic changes affecting some species of this genus were introduced on this revised list. But as the work consisted of a taxonomic listing only, and no supporting information was provided, uncertainty remained concerning certain taxa whose rank was nomenclaturally modified. We were able to clear up some of the enduring questions concerning certain taxa of this genus by re-examination of original and supplementary holdings at the Natural History Museum (London), Naturalis Biodiversity Center (Leiden), National Museum of Natural History (Washington), including available types, and the specialized collections of one of us (V. Brou), along with a number of colleagues (G. Behounek & W. Speidel, Munich, Germany). This contribution provides a synopsis of the species occurring in the Australian Region, from east of the Wallace line to the Central Pacific. A few comments concerning some allied species from the Oriental Region are provided to clear up the systematic relationships and taxonomy. During the course of our investigations, three new species were discovered and are described herein.

Abbreviations of repository collections:

ANIC – Australian National Insect Collection, Canberra, Australia;
CMNH – Carnegie Museum of Natural History, Pittsburgh, U.S.A.;
HUMS – Hokkaido University Museum, Sapporo, Japan;
LSUK – Linnean Society, London, United Kingdom;
MWNH – Museum Wiesbaden Naturhistorische Sammlungen, Germany;
NBC – Naturalis Biodiversity Center, Leiden (= former RMNH), the Netherlands;
NHMUK – Natural History Museum, London (= former BMNH and NHM), United Kingdom;
NMNH – National Museum of Natural History, Washington (= former USNM), U.S.A.;






OUMNH – Oxford University Museum of Natural History, United Kingdom;
SAMA – South Australian Museum, Adelaide, Australia;
ZMUC – Zoological Museum of the University, Copenhagen, Denmark.

Taxonomic part

Descriptions of the new species

***Eudocima oliveri* Zilli et Brou sp. nov.** (Figs 1-3, 21, plate 158 figs 3-5)

Holotype ♂ NHMUK: Vanuatu [= New Hebrides], Aneityum [= Anatom] Island, Agathis Camp 11, 50' [feet], 19-21.VII.1971, G.S. Robinson leg. (*Royal Society Expedition*), BMNH(E)1378103, gen. slide BMNH Noct. 22071.
Paratypes 2 specimens: 1♂ NHMUK: same data as holotype, BMNH(E)1378101, gen. slide BMNH Noct. 14736; 1♀ NHMUK: Espiritu Santo, Apouna River, Camp 2, 450' [feet], 26-27.VIII.1971, G.S. Robinson leg. (*Royal Society Expedition*), BMNH(E)1378102, gen. slide BMNH Noct. 22065.

Derivatio nominis: The new species is named for Oliver Zilli, the youngest son of the senior author.

Male: Length of forewing 39-42 mm (N = 2). Habitus similar to *Eudocima phalonia*, with comparatively more compact, less elongated forewings. Head relatively medium-sized. Thorax stout, lilac-rusty brown, with conspicuous fulvous notal tufts. Forewings with broadly convex termen, fairly produced tornal hook, long, moderately deep anal excision along inner margin and relatively small anal flap; ground color varying from greenish-golden ochre variously mottled with rusty brown speckles and ripples to more extensively suffused with dark lilac brown; transverse lines thick and blurred, dark lilac-rusty brown, lined with diffuse dark grey on side facing median area; antemedial line oblique, running from one-third of costa length towards anal flap, but faded just below anal vein, slightly incurved between cubitus and anal vein; diffuse dark brown patch with indistinct margins in place of discal stigma which merges with median shade, this only evident on middle of disc; postmedial line starting well before apex, smoothly convex and reaching anal margin beyond anal flap; apical streak bisecting apex variably expressed, very diffuse, dark rusty brown, with some diffuse dark grey or rusty shades below it in antemarginal area; fringe concolorous with ground color; veins dotted dark grey. Hindwings bright pale orange, suffused with dark brown basally; discal spot black, quite elongated and only feebly curved or flexed, slightly narrower at middle; distal black band broad, widest superiorly, ending in correspondence with vein CuA2, and enclosing big marginal intervenular rounded spots, these proximally pale orange and distally white; fringe concolorous with corresponding wing margin. Legs conspicuously tufted. Abdomen pale orange, suffused with dark brown basally; small median corema on sternum A8. Underside similar to *E. phalonia*, the hindwing maculation closely matching that of the upperside.

Male genitalia (Figs 1-3): Overall configuration similar to *Eudocima phalonia* (Figs 4-5). Tegumen-vinculum ring comparatively weak, tegumen longer than vinculum, this thin and arcuate; valva broad and elongated, flat, of approximately uniform width all through, but markedly sinuous, ending apically as broad triangular plate outwardly projected, its ventral margin thus distinctly concave below apex, then broadly convex anteriorly towards and along saccular section. Uncus with long and comparatively slender stem, distally dilated. Tuba analis with neatly invaginated, weakly sclerotized rugose scaphium. Juxta similar to *E. phalonia*, its paired processes very wide and straight, abruptly tapered at tip. Aedeagus and vesica also similar to *E. phalonia*, the latter small in size, compact and less reclinate.

Female: Length of forewing 39 mm (N = 1). Habitus similar to female *Eudocima phalonia*, forewings appearing broader, less elongated. Head and thorax brown, less stout than in male; legs more feebly tufted, slender. Forewings with crenulated termen, ground color variously mottled with pale and dark brown blotches, speckles and ripples, the latter extended over entire wing surface; blackish brown streak from wing base to inner part of median area below anal vein; transverse lines similar to female *E. phalonia*, antemedial line irregularly waved, weakly expressed, postmedial line irregularly jagged and nearly indistinct from costa to CuP, incurved between veins posteriorly; median area feebly paler than basal area and beyond postmedial line, except for broad dark median shade between cubitus and anal vein; discal stigma dark brown, subtriangular, preceded by thin dark brown streak; small pale irregular mark in interspace CuA1-CuA2 in correspondence with postmedial vein; distal area shared between wide warm brown inner suffusion and pale antemarginal area, the boundary broadly sinuous and blurred; pale area irrorated with dark brown speckles and ripples; fringe concolorous with corresponding antemarginal area, and darker scales on veins. Hindwings as in male, paler lemon-






yellow, with thinner discal spot; fringe as in male, with small black tornal spot. Abdomen and underside similar to male, but paler colored.

Female genitalia (Fig. 21): Overall configuration similar to *Eudocima phalonia* (Fig. 22). The antevaginal spine straight, ostium bursae very wide, posterior triangular sclerotization on membranous sternum A8; ductus bursae narrow and comparatively long, rugose, bursa copulatrix elongated and ridged, narrowest at middle, with anteriorly reclinate fundus to left. Ovipositor similar to *E. phalonia*.

Diagnostic remarks: Despite resemblance to the Fijian endemic species *Eudocima paulii* (Robinson, 1968), this new species is a close relative of *E. phalonia* (Linnaeus, 1763), and likely represents an insular offshoot occurring in the Vanuatu. Male *E. oliveri* can be separated from that of *E. paulii* by its larger size, more elongated forewings, bowed postmedial line on middle of forewing disc (straight in *E. paulii*), absence of white discal spot of forewings, more slender and straighter discal spot of hindwings, and very different genitalia configuration (Figs 13, 20). Outwardly female *E. paulii*, particularly those of some color forms, may more closely resemble that of this new species but *E. paulii* is smaller in size, does not have a brown subtriangular discal spot of forewings, replaced by a whitish dot, and has a broader and more incurved discal spot on the hindwings, including vastly different genitalia (Fig. 29). Compared to *E. phalonia*, males of *E. oliveri* are distinguished by broader and less elongated forewings, conspicuously mottled with rusty brown speckles and ripples, blurred, less sharp transverse lines, indistinct discal spot of forewings, and straighter discal spot of hindwings. More notable differences of the male genitalia of *E. oliveri* are the sinuous shape of the valva, and outwardly projecting apex, juxtaposed to that on *E. phalonia*, where the apex is aligned with the longitudinal axis of valva, and wider and straighter processes of juxta, a longer and thinner uncus, and smaller and less reclinate vesica towards the aedeagus. In the female genitalia, *E. oliveri* can be separated from *E. phalonia* by the broader ostium bursae, smoother and straighter antevaginal spine, thinner and longer ductus bursae, and reclinate, foot-shaped fundus bursae.

Distribution: Only two males of this new species are currently known from Aneityum, the most south-eastern island of the Vanuatu (New Hebrides) (geographically set apart and politically disputed Matthew and Hunter Islands excepted). These males show a clear systematic link to *E. phalonia*, so we have little hesitation in considering the single female from the northern Espiritu Santo Island conspecific, as it is related albeit clearly distinct from *E. phalonia.* Accordingly, the distribution of *E. oliveri* occurs across the entire Vanuatu Archipelago. We also confirm the sympatric presence of *E. phalonia* in Aneityum (2♂, Red Crest, 1,200ft, 3m. N.E. of Anelgauhat, III.1955, L.E. Cheesman, in NHMUK). From Vanuatu *E. phalonia* was previously recorded by several authors, e.g. Tams (1935), Viette (1948; 1949) and Cochereau (1965). In particular, Cohic (1953) recorded outbreaks of *E. phalonia* from Aneityum Island, but whether all these records actually refer to *E. phalonia*, or at least in part *E. oliveri*, is unknown. In addition to the aforementioned two males, from Vanuatu we have also examined specimens of *E. phalonia* from Ambae I. (= Aoba), Pau Uma (= Paama) and Malakula (in NHMUK). Interestingly though, the new species was preliminarly identified as *E. paulii* by G.S. Robinson in his collecting data sheets for the Vanuatu ([Robinson], undated), and was clearly kept separate from *E. phalonia*, recorded in turn from Espiritu Santo, Malakula, Efate and Erromango.

***Eudocima martini* Zilli et Brou sp. nov.** (Figs 18-19, 27, plate 165 figs 3-4)

Holotype ♂ NHMUK: Solomon Islands, Rendova, February 1904, A.S. Meek leg., BMNH(E)1378113, gen. slide BMNH Noct. 14826.

Paratype 1♀ NHMUK: Solomon Archipelago, Bougainville, May 1904, A.S. Meek leg., BMNH(E)1378111, gen. slide BMNH Noct. 22063.

Additional material 1♀ NHMUK: Solomon Islands, Guadalcanal, Popomanaseu ascent, Nuhu village, 28.X.1965, Royal Society Expedition leg., BMNH(E)1378112, gen. slide BMNH Noct. 22064.

Derivatio nominis: The new species is named for Martin Zilli, the eldest son of the senior author.

Male: Length of forewing 33 mm (N = 1). Habitus compact. Head large, chocolate brown in color; eye large and globular; antenna filiform, brownish orange in color; labial palpus long, first and second joints thick, compactly scaled, brown dorsally and at sides, light orange ventrally, second joint feebly incurved at base, third joint rod-like, brown, light-orange-tipped; frons with compact scale vestiture, looser at sides due to abrasion with palps. Thorax chocolate brown, darkest at tip of notal tufts. Forewings broad, with slightly irregularly crenulated termen, tornal angle broadly rounded, minimal excision along inner margin and little produced, conspicuously hairy anal flap; ground color medium chocolate brown with various darker or rusty paler brown, the latter especially between postmedial





and submarginal lines; very sparse irroration of whitish scales along costal area; transverse lines barely discernible darker appearing lines, antemedial line perpendicular to costa, then bent on radius and running oblique to anal flap, crenulated irregularly; median shade fairly broad and straight from below discal spot to just beyond anal flap, postmedial line little distinct, thin, sub-rectilinear from costa to M3, where it bends inwardly to continue to inner margin beyond basal flap; cell with small discal longitudinal streak, terminated by lenticular greenish-golden discal spot; submarginal line broadly waved, splitting the distal area between inner rusty band and outer dull brown antemarginal area; fringes unicolorous dull brown; veins accentuated with conspicuous dark greyish brown dots. Hindwings pale orange, suffused dark brown basally and with wide blackish brown distal band, its inner margin subparallel to termen on middle of disc, then oblique and reaching wing margin at tornus; distal band enclosing small yellowish white marginal intervenular subquadrate spots; fringe concolorous with corresponding antemarginal area. Legs from light orange to pale greyish brown, darker brown dorsally, slender, protibia thickly clothed albeit comparatively slender, showing white dorsal dot at one third from base and additional whitish mark at very base. Abdomen colouration unstudied [due to dissection already being done on available male singleton]; presence of corema on sternum A8 [brushed off during dissection] can be inferred by well developed, long corematal frame. Underside of forewings extensively suffused medium brown, except for lighter basal one-fourth and distal subrectangular patch, light orange colored, hindwings otherwise as on upperside.

Male genitalia (Figs 18-19): Apparatus overall slender, with elongated tegumen, much longer than vinculum, this V-shaped. Valva simple, elongated and with very long sacculus, narrow at base then gradually widening, widest at distance of one fourth from apex, then slightly constricted along dorsal margin before apex, this hairy, broadly rounded, ventral margin smoothly convex. Uncus with triangular base, very long and slender, cylindrical, smoothly arched, ending into sharp apical spine. Juxta small, with broad basal trapezoid plate and short paired triangular superior processes. Tuba analis with two long thin scaphium ridges. Aedeagus cylindrical, long and narrow, ending into obovate-spatulate apex, vesica unstudied [due to dissection already being done on available male singleton], with thick patch(es) of small hair-like cornuti.

Female: Length of forewing 39 mm (N = 1). Habitus and head as in male, same on legs, except protibia is shorter tufted, forewing shape less compact, more prominent tornal hook and anal flap. Thorax has varying shades of dark brown, some whitish irroration on tegulae and notal tufts, the latter vivid fulvous posteriorly. Ground color of forewings less uniform than in male, but more distinctly variegated and rippled with various shades of brown, and sparse spattering of whitish irroration; basal area with broad blackish-brown buff below anal vein to just beyond antemedial line; transverse lines as in male, except for postmedial line, much more irregular and jagged on veins anteriorly, scalloped and inwardly curved between veins posteriorly, and submarginal, thicker; discal cell with small blackish brown ovate spot, conspicuous lenticular colored terminal stigma as on male; greenish golden patches at middle of median area, adjoined to antemedial line and along anal margin; distal area band between postmedial and submarginal lines a slightly paler rusty-brown than ground color, with veins demarcated brown in color, and dotted as on male; fringes as on male. Hindwings similar to male, with larger marginal spots. Abdomen pale orange. Underside similar to male.

Female genitalia (Fig. 27): Segment A8 frustum of a cone-shaped but with anterior margin of sternum projected antero-ventrally forming subrectangular sclerotized frame surrounding ostium bursae, membranous without distinct antrum; midventral section of sternum A8 membranous, distinctly sclerotized trapezoid lamella postvaginalis; flat, short and triangular apophyses anteriores. Long, narrow, and uniform width ductus bursae and sclerotized ridges anteriorly; small and ovoid bursa copulatrix. Ovipositor tightly linked to preceding segment due to very short intersegmental membrane, conspicuously large, subquadrate papillae anales bearing long setae; apophyses posteriores thin and rod-like, as long as papilla analis.

Female from Guadalcanal (Plate 165 fig. 5): the single female available from this island is in good agreement with that from Bougainville but differs in a few respects, more than its striking pattern, also by some features of the genitalia (see below). Despite this, we provisionally consider it conspecific with the males but prefer to exclude it from the type series, pending assessment of the whole range of variation of these apparently rarest *Eudocima* on the various islands of the Solomon Archipelago. Length of forewing 38 mm (N = 1). Habitus as in female described above, with apparently less robust and darker brown thorax, straighter antemedial line of forewing more extensive greenish golden stripes






in median area, and outstanding greenish golden band in place of rusty brown one between postmedial and submarginal lines. Genitalia (Fig. 28): the sclerotized frame surrounding ostium bursae appears distinctly wider and more robust, lamella postvaginalis is wider and excised anteriorly at middle, ductus bursae is narrowest posteriorly, then widened, and anterior sclerotized section longer.

Diagnostic remarks: Together with *Eudocima caesar* (C. Felder, 1861) (in part), *E. iridescens* (T.P. Lucas, 1894), *E. cocalus* (Cramer, [1777]), and *E. kuehni* (Pagenstecher, 1886), within this group occurring from Wallacea into the Pacific, *E. martini* is one species without black discal spots on the hindwings, though features of its forewing pattern (e.g. greenish golden discal spot) and differences in genitalia configuration make it unmistakable. Features of both male and female genitalia of *E. martini*, such as the long thin uncus, small juxta, thin aedeagus and very small bursa copulatrix are unusual within the genus *Eudocima*.

Distribution: Currently known only from the Solomon Archipelago, where it is likely endemic and apparently very rare. We located a second female of the green banded form in the Cornell University Insect Collection, but damaged with only three intact wings, and minimal label data, i.e. (from) Solomon Islands.

***Eudocima steppingstonia* Brou, Klem, Zaspel et Zilli sp. nov.** (Figs 6-8, 23, plate 161 figs 1-3)

Holotype ♂ NMNH: Marquesas Islands, Fatu Hiva, Mt Teoaiua [= Teearua], 2,000 ft, 22.III.1968, J.F.G. & T.M. Clarke leg., USNMENT01069399, gen. slide.

Paratypes 2♀ NMNH: Marquesas Islands, Fatu Hiva, Mt Upe, 2,025 ft, 3.IV.1968, J.F.G. & T.M. Clarke leg., USNMENT01069400.

Derivatio nominis: The new species is named following latinization of the concept of "stepping stones", the phenomenon in dynamic biogeography which its ancestor should have undergone in order to colonize the remote island of the Pacific where it occurs.

Male: Length of forewing 41 mm (N = 1). Overall habitus somewhat similar to members of the *Eudocima cajeta*-group. Head large, chocolate brown in color; eye large and globular; antenna filiform, dark brownish orange in color; labial palpus long, chocolate brown outside, paler beige internally, with first and second segments thick, compactly scaled, and third one slender, apically spatulate with dilated tuft; frons thickly clothed with hood-shaped, quite rough scale vestiture. Thorax chocolate brown. Forewings elongate with acute apex and feebly crenulated termen, pronounced albeit not distinctly hooked tornal angle, long shallow anal excision and conspicuous anal flap; ground color rather uniform chocolate brown, albeit darker in proximal half of wings, with lilac shine; transverse lines deep dark brown but mostly indistinct against ground colour, traces of subbasal line discernible with particular orientation of wing, antemedial line thin, smoothly convex, median shade wide and blurred, straight from discal stigma to anal flap, postmedial line smoothly convex, almost faded, submarginal line as a very faint, slightly sinuous hue in anterior half of distal area; discal cell with deep blackish brown dot, terminated by broad lenticular discal stigma; veins dotted dark blackish brown and along anal margin in distal half of wings; fringe concolorous with ground color. Hindwings comparatively oblong, with slightly crenulated outer margin, pale yellowish straw colored with smoky brown discal spot and distal band, these markings with irregularly scalloped and blurred edges, the spot long with large posterior lobe much prolonged towards wing margin, and band ending well before anal angle; fringe chequered beyond distal band, concolorous with ground color in interspaces and smoky brown at veins, elsewhere as ground color. Legs slender, chocolate brown externally, paler beige internally, with rough fringe of long hair-like scales on outer side of protibia. Abdomen pale yellowish straw on both sides, feebly irrorated with brown middorsally at very base; corema on sternum A8 small. Underside of forewings with quite rough scaling in basal half, broadly straw colored in basal area, along anal margin and with two blotches beyond middle of disk, otherwise smoky-brown; underside of hindwings extensively straw colored, patterned as on upperside except for much fainter distal band, turning in apical and costal areas into tiny ripples dissolving against pale ground color.

Male genitalia (Figs 6-8): Overall configuration similar to members of the *Eudocima phalonia*-group. Tegumen hood-like, massive with respect to vinculum, this thin and arcuate; valva small, lozenge-shaped. Uncus greatly developed with long finger-like stem, incrassate distally with hooked tip. Tuba analis conspicuous, with long rugose scaphium analogously developed to accommodate uncus. Juxta similar to *E. phalonia*, its paired processes not of uniform width though, but broadest at base and gradually tapered towards slightly sinuous tip. Aedeagus and vesica also similar to *E. phalonia*, with corpus of vesica bearing dorsally patch of quite stout deciduous, basally minutely spiculated









cornuti, and a ventrally protruding lobe.

Female: Length of forewing 40-42 mm (N = 2). Habitus similar to females of the *Eudocima cajeta*- and *E. phalonia*-groups. Head and thorax as in male, more minutely variegated with paler and darker brown and sparse beige scales, the frons tipped by shorter hood of scales. Forewings elongate, broader than in male, with distinctly crenulated termen; ground color distinctly mottled with pale and dark brown blotches and irregularly distributed dark to blackish brown ripples; basal area with black buff below anal vein to just beyond antemedial line; transverse lines blackish brown and mostly disrupted into ripples against ground color, subbasal and antemedial lines barely discernible, median shade thick and blurred, postmedial line more evident, similar to male although thicker and irregularly crenulated, scalloped and inwardly curved between veins posteriorly, submarginal line much better expressed than in male, running from just before apex to tornus, albeit diffuse and poorly distinct from interspace between CuA veins to below; discal cell with distinct blackish brown dot, terminated by large sock-shaped discal stigma; distal area shared by submarginal line into inner section with particularly homogeneous tinges, chocolate brown anteriorly and beige posteriorly, and beige antemarginal section densely irrorated with dark to blackish-brown ripples; veins and anal margin more conspicuously dotted than in male; fringe dark brown. Hindwings particularly oblong, patterned as in male, with more conspicuously chequered fringes. Legs and abdomen colored as in male, with darker brown very tip of the latter. Underside patterned as in male, with similar to much stronger dissolution of dark markings into ripples against pale ground color, especially as regards distal band of hindwings, which may thus be particularly cleared.

Female genitalia (Fig. 23): Overall configuration similar to members of the *E. phalonia*-group; antero-ventral portion of segment A8 wide and little extended anteriorly, antevaginal spine stout and straight, comparatively broad-based and gradually tapered to pointed tip; sternum A8 sclerotised posteriorly, embedding triangular lamella postvaginalis, and with thickly setose posterior margin; apophyses anteriores comparatively strong, well sclerotized; ostium bursae of medium width, ductus bursae medium long, rugose, bursa copulatrix long and rugose, ridges weakly sclerotized in posterior half, fundus slightly reclinate to right. Ovipositor with thin rod-like apophyses posteriores and thickly setose papillae anales.

Diagnostic remarks: Despite its possibly closest resemblance in habitus with members of the *Eudocima cajeta*-group, the new species shows clear affinities in both male and female genitalia with those of the *E. phalonia*-group. It can easily be distinguished from any of the latter by several features of the habitus such as the extensively smoky-suffused forewings or the particularly pale and oblong hindwings with blurred-edged markings whose outer margin does not protrude in correspondence of vein 3A. The most striking diagnostic characters are found however in the male genitalia, notably in the greatly developed elongated uncus which sharply contrasts with the usual short stout configuration seen in the *E. phalonia*-group and most *Eudocima* in general. Other meaningful differences are found in the configuration of valvae, juxta, vesica and the stouter spiculated cornuti of the latter. In the female genitalia the new species shows possibly the closest similarity with *E. oliveri* sp. nov., although it can be easily differentiated from this, among the other, by the shorter and wider ductus bursae and the fundus bursae reclinated to the right instead of left.

Distribution: Currently known only from Fatu Hiva, the most isolate of the Southern Marquesas Islands. The type series was collected during the expedition accounted on by Clarke (1986).

Annotated list

A full taxonomic layout of the species of *Eudocima* known to occur in the Australian region is presented. Particular attention was made to checking original descriptions in order to properly determine primary type materials. The notation “by likely monotypy” implies that there are indications that only one specimen was available to the descriptor. This evidence may take the form of no range measurement being given, an indication of only one person having communicated the specimen to the descriptor, subsequent statements by the same author, or the location of only one extant specimen. When in original descriptions intervals of body measurements or more collectors were given, but no specimens were declared as types, this led us to consider that more specimens were available and that they have the status of syntypes, regardless of the descriptor labelling one of them as “(holo)type”.

***Eudocima aurantia* (Moore, 1877)** (Plate 152 figs 1-2)

Ophideres aurantia Moore, 1877. *Proceedings of the scientific Meetings of the zoological Society of London*






1877 (3): 607. Type locality: S. Andamans. Type material: number and sexes originally unspecified, male(s) only after subsequent indication by Moore (1881), ♂ holotype [by likely monotypy], implicitly designated as lectotype by Swinhoe (1900), in NHMUK (examined).

= *Adris rutilus* Moore, 1881. *Transactions of the zoological Society of London* 11 (3): 70. Type locality: Ceylon. Type material: unspecified number albeit at least two male syntypes, ♂ syntype, in NHMUK (examined).

Widespread in the SE Palaearctic, Oriental and Australian regions, in the latter it extends from Wallacea across New Guinea and Northern Australia (Queensland) to east of the Sahul shelf in the Bismarck Archipelago (New Britain, New Ireland) and the Solomon Archipelago (Bougainville, Nggela (= Florida) Is.).

***Eudocima prolai* Zilli et Hogenes, 2002** (Plate 152 figs 3-4)

Eudocima prolai Zilli et Hogenes, 2002. *Quadrifina* 5: 157, figs 10-11, 40, 42-45. Type locality: Irian Jaya, Star Mountains, Abmisibil, 1890 m. Type material: ♂ holotype [by original designation], in NBC (examined).

So far known from New Guinea only.

***Eudocima cocalus* (Cramer, [1777])** (Plate 152 figs 5-6)

Phalaena Noctua cocalus Cramer, [1777]. *De uitlandsche Kapellen voorkomende in de drie Waereld-Deelen Asia, Africa en America by een verzameld en beschreeven* 2: 59 [text], 148 [index], pl. 134, fig. B [name dates from main text]. Type locality: Oostindiën. Type material: number and sexes originally unspecified but a single male illustrated, probably lost.

= *Noctua maculata* Weber, 1801. *Observationes entomologicae, continentes novorum quae condidit generum characteres, et nuper detectarum specierum descriptiones*: 111. Type locality: ex India orientali. Type material: number and sexes originally unspecified, probably lost.

= *Ophideres plana* Walker, [1858]. *List of the Specimens of lepidopterous Insects in the Collection of the British Museum* 13: 1226. Type locality: Java, Silhet, North Hindostan. Type material: 3 syntypes, sexes originally unspecified but original wording contradictory on this issue; description and type series composite, comprising both concepts of *Eudocima cocalus* (Cramer, [1777]) and *E. hypermnestra* (Stoll, [1780]) (♀♀ syntypes from Java and Silhet, respectively, both in NHMUK, examined), hereafter ♀ lectotype: Java, here designated, in NHMUK.

= *Rhytia (Ophideres) crepidolata* T.P. Lucas, 1894. *Proceedings of the linnean Society of New South Wales* (2) 8 (2): 149. Type locality: Geraldton. Type material: unspecified number albeit at least two male syntypes, in SAMA.

Pending synonymy: *Phalaena Noctua hypermnestra* Stoll, [1780], in Cramer P. & Stoll C., [1780-1782]. *De uitlandsche Kapellen voorkomende in de drie Waereld-Deelen Asia, Africa en America by een verzameld en beschreeven* 4: 69 [text], 249 [index, misprinted as 251], pl. 323, figs A-B [name dates from main text]. Type locality: Kust van Coromandel. Type material: number and sexes originally unspecified, but a female illustrated (recto/verso), probably lost (Plate 153 figs 1-3).

The original combination of *Phalaena Noctua cocalus* occurs in the main text by Cramer ([1777]: 59), as he states at the species being described next on Fig. C that this "behoort nevens Fig. B. onder de *Phal. Noctuae*".

Both the description and type series of *Ophideres plana* clearly incorporate the concepts of *E. cocalus* and *E. hypermnestra* (Stoll, [1780]), as Walker ([1858]) considered *O. plana* to include also a variety with paired black discal spots on the hindwings and with the black border not extending to the interior angle. Accordingly, in order to stabilize nomenclature, the syntype from Java in NHMUK, which corresponds to the current concept of *E. cocalus*, is here designated as lectotype. Despite the fact that Walker's description of forewings is applicable only to females, in describing his variety he states that it has "marginal spots larger than in the female", which implies he had also a male at disposal. The tracing of only two out of three original specimens of *O. plana*, both females, does not allow to solve this issue, although it is worth mentioning that Walker was often wrong in recording sexes.

Eudocima cocalus is widely distributed from SE Asia (Sunda Islands, Philippines) across Wallacea to New Guinea, Australia (Western Australia, Queensland), the Bismarck Archipelago (New Britain, New Ireland, St. Matthias, St. Aignan), Nissan I. and the Solomon Islands (Santa Isabel, Nggela = Florida Is). Nonetheless, research is currently in progress to assess whether *E. hypermnestra*, which is currently credited with species status, should be sunken into *E. cocalus*. In fact, despite some noteworthy differences in the habitus, notably the presence of paired black discal spots on the hindwings, the more neatly scalloped inner margin of the distal black band of the hindwings, the same band enclosing larger pale marginal spots and barely reaching tornus, no meaningful structural differences between the two in the genitalia have been found. It is worth noting that another species from this group sharing an overall similar pattern (bending of postmedial line of forewing excepted), the Philippine endemic *Eudocima treadawayi* Zilli et Hogenes, 2002, is deeply differentiated in geni-







talia configuration.
Concerning their distribution, *E. hypermnestra* and *E. cocalus* seem to be substantially allopatric, with some noteworthy albeit questionable exceptions. There are a handful of old records of *E. cocalus* from Hindostan, Coromandel, Bengal and Silhet (Walker, [1858], Moore, 1867, 1881; Hampson, 1894), thus well within the range of *E. hypermnestra*, but we were unable to locate any vouchers in support of these quotations. It should be noted, however, that some confusion about the two concepts happened in the past, as shown by the case of *Ophideres plana*, which was usually considered to relate to the species other than *E. hypermnestra* but its original concept included also real *E. hypermnestra* from the Indian subcontinent.
A thorough check across the whole holdings at NHMUK revealed *E. cocalus* only from the Greater Sunda Islands and the Philippines eastwards, while *E. hypermnestra* is essentially a continental species ranging from India and Sri Lanka to Southern China and whole Indochina; it is also present in the Andaman and Nicobar Islands, occasionally with specimens showing faded hindwing spots. Regarding its presence in the Malay Peninsula, we could locate two old specimens of *E. hypermnestra* labelled "Malacca", whereas H.S. Barlow, who extensively collected in Genting Highlands, confirmed to have neither found *E. hypermnestra* nor *E. cocalus* over the years. He informs us also that old specimens labelled from "Malacca" were not necessarily collected in that region, but only shipped from there to Europe. However, another specimen from Penang has full collecting data which appear more reliable. It thus seems that *E. hypermnestra* may occasionally extend down the Malay Peninsula, although it is very rarely observed. In contrast, only *E. cocalus* appears to be present in Sumatra and in islands off the Malacca strait. Strangely enough, old albeit clear *E. cocalus* specimens that were labelled as from Hong Kong were located, which is quite surprising in the light of recent records of *E. hypermnestra* only from that area (Kendrick 2002). Here the same consideration as for Malacca may apply as well (H.S. Barlow, pers. comm.).
In the old literature there are also some records of *E. hypermnestra* from well inside the range of *E. cocalus* which further confirm how names have been misapplied in the past. For instance, Snellen (1876) mentions *E. hypermnestra* in Java but does not mention *E. cocalus*, which is exceedingly common in that island; or Kirsch (1877), who in recording *E. hypermnestra* from Rubi in New Guinea clearly stressed the oddity of his specimen in being completely devoid of discal spots on the hindwings, as it in fact should be for *E. cocalus*.
Populations of *E. cocalus* from New Guinea are quite remarkable in that individuals appear to be stouter bodied than Sundanian ones. Nonetheless, no other meaningful difference could be found between them.

***Eudocima discrepans* (Walker, [1858])** (Plate 153 figs 4-6)

Ophideres discrepans Walker, [1858]. *List of the Specimens of lepidopterous Insects in the Collection of the British Museum* 13: 1227. Type locality: Singapore. Type material: number and sexes originally unspecified, ♂ holotype [by likely monotypy], implicitly designated as lectotype by Swinhoe (1900), in OUMNH (picture examined).

= *Ophideres archon* [C. & R.] Felder, [1874], in Felder C., Felder R. & Rogenhofer A.F., [1865]-1875. *Reise der Österreichischen Fregatte Novara um die Erde in den Jahren 1857, 1858, 1859 unter den Befehlen des Commodore B. von Wüllerstorf-Urbair* (Zoologischer Theil) 2 (2) (Atlas): pl. 113, fig. 3. Type locality: Siam. Type material: unspecified number of females, ♀ holotype [by likely monotypy], implicitly designated as lectotype by Swinhoe (1900), in NHMUK (examined).

Zilli & Hogenes (2002) attributed authorship of *Ophideres archon* to Rudolf Felder only, most likely in error, while Zaspel & Branham (2008) did to both Cajetan Felder (father) and Rudolf Felder (son) on the basis of new evidence provided by Nässig & Speidel (2007). In reality, these authors remained in doubt and disagreed between themselves in the attribution of authorships for taxa described by "Felder" on plates 108-140 (Felder et al. [1874] in [1865]-1875), and concluded that if a role by Cajetan in the descriptions can be given as granted, a contribution by Rudolf was still possible, particularly for plates 108-120. They suggested therefore to use "C. (& R.?) Felder". Due to enduring uncertainty on this issue and unfeasibility of disentangling the role by Rudolf, if any, with respect to his father's, we prefer to highlight this situation by putting both names within brackets. As concerns the dates of publication, plate 113 is undated and lies between two plates edited as in 1873, but Nässig & Speidel agree with Fletcher (1979) in dating the whole Heft 4 containing plates 108-120 as from 1874.
Widespread in the SE Palaearctic and Oriental regions from India eastwards, its range also partly extends in Wallacea, precisely in the lesser Sunda Islands up to Flores. Replaced to the east by its vicariant *Eudocima muscigera* (Butler, 1882). Records of *E. discrepans* from New Guinea (Kononen-






ko & Pinratana 2005) are therefore most likely due to misidentification with this latter.

***Eudocima muscigera* (Butler, 1882)** (Plate 154 figs 1-4)

Purbia muscigera Butler, 1882. *The Annals and Magazine of natural History, including Zoology, Botany, and Geology* (5) 10 (57): 230. Type locality: New Britain. Type material: number and sexes originally unspecified, ♂ holotype [by likely monotypy], in NHMUK (examined).

An eastern vicariant of *Eudocima discrepans* (Walker, [1858]) characterized by a distinctly smaller size, squarer shape of forewings with nearly straight termen and more oblique transverse lines on disc, and sharing with this species a similar sexual dimorphism. So far known from Aru Is, Dampier Strait group, New Guinea, Japen I., Fergusson I. and the Bismarck Archipelago (New Britain, New Ireand, Mioko I.).

***Eudocima homaena* (Hübner, [1823])** (Plate 154 figs 5-6)

Othreis homaena Hübner, [1823]. *Verzeichniss bekannter Schmettlinge* [sic]: 264. Proposed as a replacement name for *Phalaena Noctua ancilla* Cramer, [1777] nec Linnaeus, 1767.

= *Phalaena Noctua ancilla* Cramer, [1777]. *De uitlandsche Kapellen voorkomende in de drie Waereld-Deelen Asia, Africa en America by een verzameld en beschreeven* 2: 84 [text], 147 [index]), pl. 149, fig. F [name dates from the index] [preoccupied by Linnaeus, 1767]. Type locality: Kust van Coromandel. Type material: number and sexes originally unspecified, but a female illustrated, probably lost.

= *Phalaena strigata* Donovan, [1804], in 1800-[1804], nec Fabricius, 1794. *An Epitome of the natural History of the Insects of India, and the Islands in the Indian Seas*: [60], pl. [48], fig. 2. Type locality: Bengal. Type material: unspecified number of females, probably lost.

= *Ophideres bilineosa* Walker, [1858]. *List of the Specimens of lepidopterous Insects in the Collection of the British Museum* 13: 1227. Type locality: Ceylon, and unspecified. Type material: 3 syntypes (1 Ceylon, 2 without locality, dubiously from Ceylon), sexes originally unspecified but description only compatible with males; ♂ lectotype from Ceylon, implicitly designated by Swinhoe (1900), in NHMUK (examined).

= *Othreis ancilla formosana* Okano, 1964. *Tohoku Konchu Kenkyu* 1 (2): 43, pl. 4, figs 2-3. Type locality: Wushe, Jen-ai-hsiang, Nantow-hsien, Central Formosa. Type material: ♂ holotype [by original designation], in HUMS.

Widespread in the E Palaearctic and Oriental regions from India and Sri Lanka eastwards, its range extends also in Wallacea, precisely in Sulawesi, Lombok, Flores and Timor. So far there are no zones of known overlap with its relative *Eudocima caesar* (C. Felder, 1861) but, interestingly, material from Sula Is (Mangole, Besi = Sanana) seems transitional to this and will require further study. Quite some geographic variation can be recognised within *E. homaena*, with individuals from the Indian subcontinent and Sri Lanka somewhat smaller and paler colored, contrary to most eastern ones. Particularly large-sized and with deeper lilac brown forewings appear to be those from Sulawesi, and at a lesser extent those from the Philippines, the former also with neatly rounder discal spots of the hindwings.

***Eudocima caesar* (C. Felder, 1861)** (Plate 155 figs 1-6)

Ophideres caesar C. Felder, 1861. *Sitzungsberichte der kaiserlichen Akademie der Wissenschaften*, (mathematisch-naturwissenschaftliche classe) 43 (1): 41. Type locality: Amboina [= Ambon]. Type material: unspecified number albeit at least two specimens of both sexes, ♀ syntype, in NHMUK (examined).

= *Othreis prattorum* A.E. Prout, 1922 **syn. nov.** *The Bulletin of the Hill Museum* 1 (2): 239; illustrated in Prout (1924b: pl. 20, figs 6-7, as ♂ holotype and ♀ allotype). Type locality: Manusela, 6,000 feet. Type material: 6♂ & 1♀ syntypes, in NHMUK (examined).

A strictly Moluccan species so far known exclusively from Halmahera, Buru, Ambon and Seram, with possible intermediate populations with the preceding species in the Sula group (see above). Interestingly, this is a polymorphic species as regards expression of the discal spot on the hindwings. Most of the few specimens known are devoid of the spot, but this happens to occur after a variable degree of expression, viz. from full to nearly obliterated, in at least three specimens from Halmahera and Seram, as already shown in Prout's (1924b) illustration of a syntype. As a result, these specimens look extraordinarily similar to *Eudocima homaena* (Hübner, [1823]) but they can easily be distinguished other than by their dimension, *E. caesar* being a much larger sized species, after the fringes of the hindwings, which are chequered black and orange in *E. homaena* and unicolorous black in *E. caesar*. Zilli & Hogenes (2002) discussed the hitherto unrecognized identity of *Ophideres caesar* C. Felder, 1861, collected by C.L. Doleschall in Ambon, and concluded that the name was most likely a senior synonym of *Othreis prattorum* A.E. Prout, 1922 but had better to be ranked as a nomen dubium. In fact, Felder (1861) directly linked his species to Cramer's *E. ancilla* (viz. female *E. homaena*) but stated





that it was larger. Considering that he did not mention any discal spot on the hindwings and which species of *Eudocima* actually live in the Moluccas, there was little doubt that *E. caesar* and *E. prattorum* would relate to the same concept, although no conclusive evidence was available. In contrast, Zaspel & Branham (2008) followed directly Poole (1989) and listed again *E. caesar* as a validly recognized species, but no new information about its identity was brought forward, although *E. prattorum* was maintained as valid as well. Following extensive search through the NHMUK collections, where types by C. Felder ended up via the purchase of his collection by L.W. Rothschild, a syntype of *E. caesar* could eventually be found. This had long been unrecognised due to the fact that its original, small label stating "Amboina Doleschall 1857" remained hidden under a larger one bearing "Felder Colln." and stacked up in a flat pile of accession labels. Its features leave no doubt therefore that the concepts of *E. caesar* and *E. prattorum* relate to the same species, hereafter the two names are brought here into synonymy and as conditions for reversal of precedence are not met (ICZN, 1999: art. 23.9) the oldest is reinstated as the valid name for the species here dealt with.

***Eudocima iridescens* (T.P. Lucas, 1894)** (Plate 156 figs 1-3)

Othreis (Ophideres) iridescens T.P. Lucas, 1894. *Proceedings of the Linnean Society of New South Wales* (2) 8 (2): 148. Type locality: Geraldton. Type material: unspecified number albeit at least two male syntypes, in SAMA.

= *Ophideres pyrocrana* A.J. Turner, 1908. *Transactions and Proceedings and Report of the royal Society of South Australia* 32: 63. Type locality: N.Q. [= North Queensland], Kuranda. Type material: ♂ holotype [by original designation], in ANIC.

The most eastern member of a group characterised by striking sexual dimorphism, whose females show a wide green transverse band crossing the forewings, which comprises also *Eudocima homaena* (Hübner, [1823]) and *E. caesar* (C. Felder, 1861). *Eudocima iridescens* always lacks a black discal spot on the hindwings and may thus look similar to unspotted individuals of its Moluccan relative, *E. caesar*. Nevertheless, it can easily be separated after its somewhat more saturated and warmer colors, smaller size, forewings of male more obovate with more sigmoid postmedial line and sharper line bisecting the apex, and above all the more uniformly arched distal band of the hindwing much prolonged towards the anal margin, and the black-tipped abdomen. Specimens from New Britain appear particularly large-sized, with comparatively narrow distal band on hindwings and, in the male sex, paler, more variegated forewings.

Known so far from Misool (= Mysol), Kei Is, New Guinea, Cenderawasih Bay islands (Moor I.), Bismarck Archipelago (St. Aignan, New Britain, New Ireland), Fergusson I., Sudest I., Rossell I., Woodlark I. (= Muyua I.), Australia (Western Australia, Queensland).

***Eudocima talboti* (A.E. Prout, 1922) stat. rev.** (Plate 157 figs 1-5)

Othreis cajeta talboti A.E. Prout, 1922. *The Bulletin of the Hill Museum* 1 (2): 238. Type locality: Manusela, 6,000 feet. Type material: 2♂♂, 2♀♀ syntypes, in NHMUK (examined), incorrectly labelled as ♂ holotype, ♀ allotype and ♂♀ paratypes.

Eudocima talboti is the most eastern member of the *cajeta*-group, which includes three superficially similar species from the Indoaustralian region characterised by sharp sexual dimorphism, the others being *E. cajeta* (Cramer, [1775]) and *E. srivijayana* (Bänziger, 1985). Males of the group show well distinct sub-parallel ante- and postmedial lines which run from costa towards inner margin of forewings, thus they define a median area which encloses a lenticular or subrectangular discal spot. The postmedial line originates at costa well before the apex and there is no apical line or streak bisecting the latter; in addition, the tornus may be distinctly inwardly hooked. In turn, females show a greatly irregularly mottled-rippled pattern which leads transverse lines to dissolve against ground color. They miss the vivid green transverse band seen in many relatives and have greatest similarities with those of the well-known fruit pest *E. phalonia* and its close allies. On the hindwings of both sexes a black discal spot and distal band are present. In the configuration of genitalia, however, the three species show little similarity to each other.

Diagnostic hints on how to distinguish the three species of the *cajeta*-group are given under *E. srivijayana*.

Eudocima cajeta (Cramer, [1775]) (Plate 158 figs 1-2, plate 166 figs 1-2) [exclusively Oriental species]

Phalaena Noctua cajeta Cramer, [1775]. *De uitlandsche Kapellen voorkomende in de drie Waereld-Deelen Asia, Africa en America by een verzameld en beschreeven* 1: 48 [text], 152 [index], pl. 30, figs A-B (male), C (female) [name dates from main text]. Type locality: Coromandel... Batavia [= India, Coromandel... Java, Jakarta]. Type






material: unspecified number of syntypes, at least two of both sexes, and lost; therefore, lectotype: ♂ [Coromandel], hereby designated in force of ICZN (1999: art. 74.4) as the specimen illustrated by both Cramer (1775, in 1775-1776) on plate 30, figs A-B and [Wartenaar Lambertz] (undated) on plate 54, figs A-B.

= *Ophideres multiscripta* Walker, [1858]. *List of the Specimens of lepidopterous Insects in the Collection of the British Museum* 13: 1226. Type locality: Ceylon. Type material: sex originally unspecified, ♀ holotype [by monotypy], in NHMUK (examined).

Due to the mixed type locality in the original description of *Phalaena Noctua cajeta*, the relevant type series, consisting of at least two albeit in full evidence lost syntypes, has to be considered as mixed too and actually combining Indian specimens of *E. cajeta* with Javanese ones of *E. srivijayana* (Bänziger, 1985). Because of the close resemblance of the two species and some mismatching features portrayed in the illustrations given by Cramer ([1775], in [1775-1776]) it is not feasible to unambiguously identify each of the two pictured specimens. The same applies to the original illustrations by [Wartenaar Lambertz] (undated) for Cramer's printed work, where the same specimens are portrayed in plate 54. Nevertheless, in the original artwork provenance of individual specimens is recorded in relevant legends. Accordingly, in the legend to plate 54, the male (Figs A-B, recto/verso) is aligned with the indication "Coromandel" and the female (Fig. C) with "Batavia" (Plate 166 figs 1-4). This is considered sufficient evidence for concluding that the male and female were of Indian and Javanese origin, respectively. Present lectotype designation of the male specimen agrees therefore with Bänziger's (1985) concept of *E. cajeta*, who erroneously considered it as solely described from Coromandel, and removes any ambiguity on the application of this name, which can therefore be applied to the most western species of the *cajeta*-group.

Diagnostic hints on how to distinguish the three species of the group are given under *E. srivijayana*.

***Eudocima srivijayana* (Bänziger, 1985)** (Figs 9-12, 24, plate 156 figs 4-6, plate 166 fig. 3)

Othreis srivijayana Bänziger, 1985. *Heterocera sumatrana* 2: 42, figs 1-3, 5 (sub *cajeta*), 9. Type locality: Indonesia: W-Sumatra, Lebong Tandai. Type material: ♂ holotype [by original designation], in NHMUK (examined).

Following the discovery of *Eudocima srivijayana*, a close relative of *E. cajeta* (Cramer, [1775]), then the only member of the group, Bänziger (1985) examined several specimens from the Indoaustralian tropics and was at the same time able to unambiguously upgrade the taxon *Othreis cajeta talboti* A.E. Prout, 1922, to species level. In fact, *E. talboti*, originally described from Seram (Moluccas) (Prout 1922), had sharp differences in the male genitalia with respect to the other two species, though these were only stated in words, no genitalia illustrations having been provided (Bänziger, 1985). *Eudocima talboti* was subsequently validated by Zilli & Hogenes (2002) on the basis of the diagnostic characters recorded by Bänziger (1985) but Zaspel & Branham (2008) placed it as a full synonym of *E. cajeta* (in reality, *talboti* was both sunken with *E. cajeta* and listed as a full species in their taxonomic list, albeit it was explicitly synonymised in the abstract and main text of the work).

After examination of several specimens of the group from the Indian subcontinent to the Papuan region, including syntypes of *E. talboti*, the specific distinction of this from the other two species in the group can fully be confirmed. External differences (including colouration) between the three species, particularly between males of *E. cajeta* and *E. srivijayana*, are really minor and not always constant, so that identification should better be based on genitalia examination. Nevertheless, no area of geographic overlap between the three species has been ascertained so far.

Diagnostic remarks: *Eudocima talboti* - Both sexes with broader forewings than its relatives, hindwings with blunter, less sharply cornered inner edge of black distal band on vein M1, and smaller discal spot. Postmedial line of forewings well bowed on middle of disc in male. Blackish mottling of female stronger marked than *E. cajeta*, similar to *E. srivijayana* albeit with neater alternation with paler pinkish-beige areas, so that a vaguely banded pattern is more evident. In the male genitalia (Figs 9-12), the valva is neatly triangular in shape, with sharp-cornered albeit slightly projected apex, and juxta consists of medium elongated and wide, sub parallel tapered paired processes reaching half of tegumen. The aedeagus is stout; vesica is small and compact T-shaped, with short branches of unequal length and almost no basal stem; shortest branch is apically tipped by voluminous curved cornutus, while longest bears on inner side a patch of spine-like, basally speculated cornuti, and is tipped by rather flimsy straight cornutus; gonoporal duct opens at very base of vesica stem. In the female genitalia (Fig. 24), the anterior margin of sternum A8 wraps around the ventral lip of ostium bursae and plicates so as to originate a posteriorly pro-





duced, short rounded antevaginal lobe overhanging antrum, and two broad subtriangular paramesial, anteriorly projected lobes that fuse internally and laterally with antrum; this is short and broad, approximately trapezoid in outline, and actually sclerotized only at sides; the midventral section of sternum A8 is membranous but bears a small, heavily sclerotized and strongly bulged lamella postvaginalis; ductus bursae very short and relatively wide, leading into strongly sclerotized and folded albeit not ridged cervix bursae; bursa copulatrix slightly displaced laterally with respect to junction with ductus bursae.

Eudocima cajeta - In general, males have fairly slender and comparatively pale forewings with well pronounced apex, tornal hook and sinuous hind margin. In the females, forewings are slender too and their dark mottling somewhat minute and uniform on a pale beige ground color. In the hindwings of both sexes, black markings are not much extended; in consequence of this, the extension of orange is quite broad; the discal spot is well developed albeit fairly narrow at middle because of rather straight or even slightly concave inner margin, and shows deep, fairly acutely pointed "<"-shaped excision along outer margin. In the male genitalia (Figs 14-15) *E. cajeta* has a distinct short tooth-like process projecting from costal margin of valva before broadly rounded apex and juxta consists of very long, slender paired processes, slightly arched inwards distally, which reach base of uncus. The aedeagus is slender; vesica consists of a single tubular, slightly reclinate diverticulum tipped by long straight cornutus; the outer side of diverticulum is distally clothed with a thick bundle of spine-like, basally minutely spiculated cornuti, and gonoporal tube opens just proximally to the bundle from approximately middle length of diverticulum itself. In the female genitalia (Fig. 25) the anterior folded part of sternum A8 wrapping ventrally the ostium bursae projects posteriorly into a conspicuous sclerotized antevaginal plate terminating into paired teeth which protrude beyond segment A8 itself; the middle part of sternum A8 is wholly sclerotized and bears a long pedunculate, overall "spoon-shaped" relief; the antrum is longer than wide; ductus bursae comparatively long and narrow, with sclerotized ridges anteriorly; bursa copulatrix slightly displaced laterally with respect to junction with ductus bursae. Much variability in the shape of the antevaginal plate has been detected after dissections of specimens from the whole species range. A screening on this character is currently being undertaken to assess whether such variability is simply inter-individual or there is some sort of geographic congruence.

Eudocima srivijayana - Forewings of males are of medium width but there is some geographic variation (notably in the Philippines) and they can closely approach in silhouette those of both preceding species. The ground color of forewings in male is generally darker than in *E. cajeta*, thus similar to *E. talboti*, while mottling in females is produced by strong and usually dark blotches, which lead them to show a blackish appearance; in these features they resemble too those of *E. talboti*, although the pattern is somewhat more confuse. The extension of black markings on the hindwings is in both sexes fairly broad. In the male genitalia (Figs 16-17) the very apex of valva prolongs into conspicuous long and sclerotized spine, and juxta is short and broad, with an overall sub-rhomboid shape, its processes being subtriangular, broad-based, and just reaching half of tegumen. The aedeagus is stout; vesica is T-shaped, with branches of unequal length, shorter one is also the widest, it is tipped by long straight cornutus and bears distally thick patch of spine-like, basally minutely spiculated cornuti on outer side; longer branch is the narrowest and bears on inner side a belt of cornuti of increasing size towards the tip; gonoporal tube branches off from vesica stem. In the female genitalia (Fig. 26) the anterior part of sternum A8 is completely folded over sternum itself producing a sort of transverse flap, this flap being actually split into two broad, heavily sclerotized paramesial parts whose external and internal walls are conspicuously ridged horizontally; the middle part of sternum A8 is wholly albeit weakly sclerotized and bears a long cuneate relief; there is neither a median antevaginal process nor a distinct antrum, and ostium bursae opens directly into comparatively short and narrow ductus bursae, whose ridges show some weak sclerotization only at junction with bursa copulatrix; bursa fully aligned with junction with ductus bursae.

Distribution: *Eudocima talboti* - Moluccas (Seram, Halmahera), Waigeo, Numfoor. Prout (1922) tentatively assigned to *E. talboti* a small-sized male in coll. Joicey probably originated from Ambon ("A ♂ in coll. Joicey, from Amboina (?), measuring only 86 mm. evidently belongs to this race..."). This very same specimen has been traced in NHMUK and is actually *E. talboti*, but it has been relabelled in the past by an unspecified person as from "North Ceram ?", likely to make it correspond more precisely with known places for this species (Plate 157 fig. 3).






Eudocima cajeta - India, Sri Lanka, Bhutan, Southern China, Myanmar, Thailand, Vietnam, Andamans. Contrary to Zilli & Hogenes' (2002) indication, the specimen from Malay Peninsula illustrated by Barlow ([1983]: pl. 35, fig. 1) is of *E. srivijayana*. As noted by the very same authors, legends to figures 4-5 by Bänziger (1985: 46-47) are inverted.
Eudocima srivijayana - Peninsular Malaysia, Singapore, Nias, Sumatra, Borneo, Java, Bali, Lombok, Sumbawa, Sumba, Flores, Timor, Sulawesi, Philippines (Panay, Negros, Leyte, Samar, Mindanao). Possibly in the Tanimbar group (1♀, coll. Speidel), but dissections needed.
As noted above, there are no known areas of geographic overlap between the three members of the *cajeta*-group, though it would be interesting to precisely assess the actual boundaries of their distributions to thoroughly reconstruct their diversification in the Indoaustralian Region. The boundary between *E. cajeta* and *E. srivijayana* should occur somewhere along Indochina, possibly in Tenasserim, given that the former has so far been observed up to Central Thailand and Southern Vietnam, while the latter already occurs in the Malay Peninsula. Specimens from Panay and Mindanao have proved after dissections to belong to the Sundanian species, same for others from Sulawesi, thus demonstrating that a substitution between *E. srivijayana* and *E. talboti* actually takes places within Wallacea. Last but not least, the latter has so far been assessed for islands around the Doberai Peninsula (Waigeo, Numfoor = Mefor) but not yet from New Guinea.

***Eudocima oliveri* sp. nov.** (Figs 1-3, 21, plate 158 figs 3-5)

Described here above from Vanuatu.

***Eudocima phalonia* (Linnaeus, 1763)** (Plate 159 figs 1-6, plate 160 figs 1-6)

Phalaena phalonia Linnaeus, 1763. *Centuria Insectorum rariorum:* 28; *Amoenitates Academicae* 6: 411. Type locality: in Indiis. Type material: number and sexes originally unspecified, ♂ lectotype designated by Mikkola & Honey (1993), in LSUK (picture examined).

= *[Phalaena] fullonia* Clerck, [1764]. *Icones Insectorum rariorum* 2: pl. 48, figs [1-4]. Type locality: [in Indiis], after indication by Linné (1763a: 4; 1763b: 387) addressing to forthcoming work by Clerck ([1764]). Type material: same as above, name most likely being a misspelling of *Phalaena phalonia* Linnaeus, 1763.

= *Noctua dioscoreae* Fabricius, 1775. *Systema Entomologiae, sistens insectorum classes, ordines, genera, species, adiectis synonymis, locis, descriptionibus, observationibus:* 593. Type locality: in Indiae orientalis Dioscoreis [= in dioscoreaceous-like plants of Oriental India]. Type material: Fabrician material referable to *Noctua dioscoreae* is in ZMUC (Aurivillius, 1898), but its type status requires probation.

= *Phalaena Noctua pomona* Cramer, [1776]. *De uitlandsche Kapellen voorkomende in de drie Waereld-Deelen Asia, Africa en America by een verzameld en beschreeven* 1: 122 [text], 154 [index], pl. 77, fig. C [name dates from the index]. Type locality: Kust van Coromandel. Type material: number and sexes originally unspecified, but a single female illustrated; ♀ holotype [by likely monotypy], in NHMUK (examined) [specimen hardly restored with wing pieces of other individuals/species and painted, in all evidence by Felder's technicians during transition in his collection before purchase by L.W. Rothschild].

= *Ophideres obliterans* Walker, [1858]. *List of the Specimens of lepidopterous Insects in the Collection of the British Museum* 13: 1229. Type locality: Navigator's Islands [= Samoa]. Type material: 2 syntypes, sexes originally unspecified, ♂ syntype in NHMUK (examined) (incorrectly noted by Brou & Zilli, 2016 as holotype).

The widespread and most economically important species of *Eudocima*, ranging from the African tropics across the Oriental, SE Palaearctic (but up to the NE as a stray) and Australian regions well into the Pacific, where after a series of parameters it has been ranked as the fourth worst pest by Waterhouse (1997).
Ongoing research is showing that apart from some close relatives well characterised on morphological ground, namely *Eudocima lequeuxi* Brou et Zilli, 2016 (E and SE continental Africa) and *E. oliveri* sp. nov. (Vanuatu), the nominal species articulates into several biotypes whose evolutionary value needs assessment. For instance, the African individuals happen to have the processes of juxta narrower than Indoaustralian ones (Zilli & Hogenes 2002), whereas New Guinean and Pacific populations were shown to have shifted larval host plants from vines of the family Menispermaceae to trees of the genus *Erythrina* (Fabaceae) (Tams 1935; Cochereau 1977; Hammes & Putoa 1986; Muniappan et al. 1994; Fay 1996; Sands & Chan 1996; Reddy et al. 2005). Interestingly, in some more remote areas such as mountains of New Guinea and New Caledonia the Menispermaceae are maintained (Cochereau 1977; Sands & Liebregts 2005), whereas *Erythrina* are also known to be occasionally used in Australia (Tryon 1924). Patterns of local differentiation, however, are likely obscured by phenomena of accidental introduction or long range dispersal, *E. phalonia* being a powerful flyer known to undergo migrations (Sands & Schotz 1991), so that strik-






ingly different forms may be found sympatrically, while others appear to gradually loosen their features when proceeding out of their own core range. This happens to be the case for the Solomon Archipelago, where two sharply different forms of males coexist, one corresponding to the usual *phalonia* male phenotypes widespread across the whole Indoaustralian region, the other restricted to this archipelago only (Plate 159 figs 2-5). The latter show less elongated forewings with more bowed outer margin, darker lilac brown ground color and indistinct streak bisecting the apex. On the hindwings they have more extended dark markings and, on the underside, despite a somewhat more melanistic appearance the discal spot of the hindwings reduces in extension, a circumstance which does not occur in males of the normal form. Males of the exclusively Solomon form have so far been observed in Bougainville, Choiseul, Treasury Is, New Georgia I., Santa Isabel, Nggela (= Florida) Is and Guadalcanal, in the last three locations in sympatry with normal *E. phalonia*. A single male from Guadalcanal shows intermediate features and cannot be comfortably associated with either of the two. Females, in contrast, appear to extensively vary from small dark, homogeneously colored to large pale, variegated individuals in an almost endless combination of sizes and patterns (Plate 160 figs 2-4). Some females also show an unusual extension of honey or golden yellow patches on forewings, a feature seen also in a few specimens from New Ireland in the nearby Bismarck Archipelago. This complex situation, coupled with the fact that no meaningful differences in the genitalia between the various forms was found, leads us to suppose that despite some differentiation there is gene exchange between the various sets of populations and any taxonomic split should better be based on genetic analyses hopefully to come.

Another interesting situation, in which insularity and evolutionary phenomena of founder's effect and genetic drift are likely playing a role, is that possibly occurring in the Samoan Archipelago, from where *E. phalonia* is known since Walker's ([1848]) description of *Ophideres obliterans* and has continuously been recorded over the time (Rebel 1910; Comstock 1963; 1966; Sands & Liebregts 2005). The available syntype of *O. obliterans* and another two old specimens from the archipelago appear as fully characteristic, large-sized normal-patterned *E. phalonia*, whereas more recent material examined by us consists of neatly smaller individuals with a somewhat marked tendency towards reduction of the discal spot of the hindwings (Plate 160 fig. 6).

In the Australian region, *E. phalonia* is widespread all over Wallacea and from New Guinea and Northern and Eastern Australia eastwards on most islands of the intertropical belt (Viette 1948; 1949; Waterhouse & Norris 1987; Davis et al. 2005), although records marginal or extralimital to the intertropical zone are considered to be due to strays or accidental import, e.g. on Lord Howe I., New Zealand and Hawaii (Meyrick 1887; Turner 1918; Holloway 1977; Heu 1986; 1988). The easternmost records in Oceania are from Hawaii (Heu 1986), Kiribati (Davis et al. 2005), Society Islands (Viette 1949) and Rapa I. (1♂, in NHMUK). As a matter of fact, the whole Pacific populations are deemed to be of recent origin from a primary Indomalay-papuan range (Waterhouse 1997), not least because on many islands *Erythrina* trees were deemed of comparatively recent introduction (Cochereau 1977). In reality, a number of *Erythrina* spp. appear to be indigenous in the Pacific, albeit their diffusion was facilitated by man (Stone 1970; Thaman et al. 2000), and also a few endemic species are known (St. John 1956; Barneby & Krukoff 1982; Wagner et al. 1990).

We suspect therefore that the situation is more complex and more waves of colonization and local differentiation may have occurred, with ancestral biotypes possibly still linked to the local Menispermaceae, also in consequence of the discovery of related endemic taxa such as *E. oliveri* and *E. steppingstonia* which likely represent offshoots derived from *phalonia*-like ancestors. Historical data at least on presence of *E. phalonia* in various islands show that its spreading into the Pacific is not a 20th century phenomenon, as the species dates at least from 1848 in Tahiti (J.N.E. Vesco leg.; Viette, 1949), 1858 in Samoa (Walker, [1858]), ante 1884 (NHMUK coll.) and 1886 in Fiji (Druce, 1888) and 1893 in Rapa I. (NHMUK coll.). Waterhouse & Norris (1987) also stated that the African populations of *E. phalonia* would have originated from the primary oriental range, an assertion which may possibly be best verified with a modern phylogeographic analysis.

A genetic characterization of the various populations of *E. phalonia* in Oceania, along with tracking the network of their evolutionary relationships, seems therefore advisable in order to better address control of this fruit pest in the Pacific. These pieces of information would provide a baseline for a more focused targeting of most harmful biotypes of *E. phalonia* with current control measures, including use of biocontrol agents such as egg and larval parasitoids. In fact, these are being released in a






number of islands (Muniappan et al. 2004; Sands & Liebregts 2005), but they might turn out detrimental to the survival of other species of *Eudocima* with restricted insular distributions.

***Eudocima steppingstonia* sp. nov.** (Figs 6-8, 23, plate 161 figs 1-3)

Described here above from Fatu Hiva in the Southern Marquesas Islands.

***Eudocima paulii* (Robinson, 1968)** (Plate 162 figs 1-5)

Othreis paulii Robinson, 1968. *The Entomologist's Record and Journal of Variation* 80 (10): 251, pl. 14, fig. [unnumbered], text-fig. 3. Type locality: Nandarivatu. Type material: ♂ holotype [by original designation], in NHMUK (examined).

A very variable species, endemic to Fiji Islands (Viti Levu and Vanua Levu).

***Eudocima jordani* (Holland, 1900)** (Plate 163 figs 1-2)

Ophideres jordani Holland, 1900. *Novitates zoologicae* 7 (3): 570. Type locality: [Buru]. Type material: 2♂ syntypes, in CMNH.

This unmistakable species ranges from Sulawesi, the Moluccas (Halmahera, Buru, Seram and Kei Islands eastwards to New Guinea, NE Australia (Queensland), the Bismarck Archipelago (Rook I., New Britain, New Ireland, New Hannover), Nissan I. and New Caledonia.

***Eudocima dividens* (Walker, [1858])** (Plate 163 figs 3-4)

Ophideres dividens Walker, [1858]). *List of the Specimens of lepidopterous Insects in the Collection of the British Museum* 13: 1228. Type locality: Java. Type material: sex originally unspecified but description only compatible with female sex, ♀ holotype [by monotypy], in NHMUK (examined).

A SW Asian element occurring in the Philippines and in Sundaland from Peninsular Malaysia to Java whose distribution extends in Wallacea to the island of Sulawesi.

***Eudocima salaminia* (Cramer, [1777])** (Plate 164 figs 1-5)

Phalaena Noctua salaminia Cramer, [1777]. *De uitlandsche Kapellen voorkomende in de drie Waereld-Deelen Asia, Africa en America by een verzameld en beschreeven* **2**: 117 [text], 150 [index], pl. 174, fig. A [name dates from the index]. Type locality: China; wrongly recorded by Zilli & Hogenes (2002) as Suriname. Type material: number and sexes originally unspecified, probably lost.

Widespread all over the Indoaustralian region from India and Sri Lanka to the Central Pacific (Fiji, Samoa and Tonga) (Viette 1948, and original observation) and in the Eastern sector of the Palaeartic, as far north as Korea and Japan, it also been recorded from Madagascar (e.g. Hampson 1894), likely on the basis of strays or spurious specimens and not confirmed from that island anymore (cf. Viette 1990). Another option is that Hampson relied on a specimen preserved in NHMUK labelled as from "Mad", an abbreviation which could well stand also for "Madras". In the old literature it has also been repeatedly recorded from continental Africa, mostly as subsequent quotations based on Hampson's (1902) from Grahamstown (South Africa), but this record has explicitly been recognized by Pinhey (1975) as due to error. We are unaware of any reasons for its quotation from Central Africa by Kononenko & Pinratana (2005).

The species appears quite homogeneous in habitus all over the Oriental and Palaearctic parts of its range, and in the most western districts of the Australian one, from Wallacea to New Guinea, Australia and the Bismarck Archipelago. In the Solomon Archipelago, however, populations are constantly characterised by a duller, brownish rather than greenish color of the forewing subtriangular patch, a much broader black distal band of the hindwings, and less elongated shape of forewings. Individuals with this pattern have so far been observed in Bougainville, Choiseul, Treasury Is, New Georgia group (Vella Lavella, Kulanbangra (= Kolombangara) I., New Georgia), Nggela (= Florida) Is, Santa Isabel and Guadalcanal, where all examined specimens conform to this phenotype. In directly adjoining islands such as Nissan I. and Rennel I. the individuals correspond to the western phenotype. The genitalia of these specimens, however, did not reveal any meaningful differences with respect to the normally-patterned *E. salaminia* from other areas of the species range. We refrain from describing a formal subspecies to depict this otherwise well-characterized and geographically consistent set of populations because some of their features happen to occur, albeit more weakly expressed, in other more southern islands to the Solomons such as New Caledonia, Vanuatu and Fiji. This evidence leads us to suppose that in the Pacific area there are ongoing faunal exchanges which may contribute to the diffusion of particular genetic traits which originated in semi-isolated populations in different islands. In Tonga and Samoa the individuals






appear fully normally-patterned again.

***Eudocima nigricilia* (A.E. Prout, 1924)** (Plate 163 figs 5-6)

Eumaenas salaminia nigricilia A.E. Prout, 1924. *The Bulletin of the Hill Museum* 1 (3): 449. Type locality: Dutch New Guinea: Mount Kunupi, Menoo Valley, Weyland Mountains, 6,000 feet. Type material: ♂ holotype [by original designation], in NHMUK (examined).

So far known from New Guinea only. Incorrectly ranked as a subspecies of *Eudocima salaminia* (Cramer, [1777]) by Kononenko & Pinratana (2005).

***Eudocima materna* (Linnaeus, 1767)** (Plate 165 figs 1-2)

Phalaena materna Linnaeus, 1767. *Systema Naturae (Editio duodecima reformata)* 1 (2): 840. Type locality: in Indiis. Type material: number and sexes originally unspecified, but description compatible with female only; ♀ lectotype designated by Mikkola & Honey (1993), in LSUK (picture examined).

= *Noctua hybrida* Fabricius, 1775. *Systema Entomologiae, sistens insectorum classes, ordines, genera, species, adiectis synonymis, locis, descriptionibus, observationibus:* 593. Type locality: India... nova Hollandia. Type material: number and sexes originally unspecified, but description compatible only with females and based on at least two syntypes; Fabrician material referable to *Noctua hybrida* is at ZMUC (Zimsen 1964), but its type status requires probation, ♀ syntype (ex coll. Banks) in NHMUK (examined).

= *Ophideres chalcogramma* Walker, 1865. *List of the Specimens of lepidopterous Insects in the Collection of the British Museum* 33: 937. Type locality: Zambesi River. Type material: originally unspecified number of male(s), likely one; types not traced and probably lost.

Widespread in the African, S Palaearctic and Indo-australian regions up to the Central Pacific, in some areas of its vast range the species seems quite scarcer than in others, so there is a particular paucity of records from east of the Indian subcontinent to the Philippines in the north and New Guinea in the east, whereas the species seems to become more common in Australia and the Pacific. This species is replaced in the Americas by the vicariant *Eudocima apta* (Walker, [1858]).

***Eudocima martini* sp. nov.** (Figs 18-19, 27-28, plate 165 figs 3-5)

Described here above from the Solomon Archipelago.

***Eudocima kuehni* (Pagenstecher, 1886)** (Plate 161 fig. 4-6, plate 166 fig. 5)

Ophideres kühni Pagenstecher, 1886. *Jahrbücher des nassauischen Vereins für Naturkunde* 39: 137 (as *kühni*, incorrect original spelling), pl. 10, fig. 6 (as *kühnii*, misspelling). Type locality: Neu-Guinea. Type material: ♂ holotype [by original designation], incorrectly stated in the original description to be a female, in MWNH.

= *Lagoptera pratti* Bethune-Baker, 1906 **syn. rev.** *Novitates zoologicae* 13 (2): 260. Type locality: Mafalu, 6000 ft. Type material: ♂ holotype [by monotypy], in NHMUK (examined).

Lagoptera pratti Bethune-Baker, 1906 was described on the basis of a male specimen from Mafalu, New Guinea (Bethune-Baker, 1906). The outstanding markings of the holotype never left any doubt about the fact it was conspecific with the species that had before been named as *Ophideres kuehni* Pagenstecher, 1886, a strongly sexually dimorphic species from the Papuan region (Pagenstecher, 1886). In fact, this is possibly the only one out of all the world species of *Eudocima* that show sexual dimorphism in which the male is more strikingly patterned than the female, a fact that also explains the original Pagenstecher's (1886) mistake about the sex of the holotype. Accordingly, *Lagoptera pratti* was sunken into synonymy with *Ophideres kuehni* and combined as such e.g. in Poole (1989) and Zilli & Hogenes (2002). In the list by Zaspel & Branham (2008), however, "*Eudocima pratti*" was raised to species status. This happened in consequence of the examination by these authors of a series of *E. prolai* Zilli, Hogenes, 2002 in a temporary drawer of the supplementary collection at the NHMUK which was bearing an external label "*pratti*", so they assumed that "*E. pratti*" was a completely differently looking species from *E. kuehni*. In reality, the holotype of *Lagoptera pratti* was available in the main collection, always at the NHMUK, and this unambiguously corresponds to a male *E. kuehni*, whereas *E. prolai*, which had however been maintained as valid by Zaspel & Branham (2008), is a markedly different species (see above). The fact that the holotype of *Lagoptera pratti* is actually the specimen illustrated here (Plate 161 fig. 5) is further demonstrated by the existence of a portrait of its among those commissioned by G.F. Hampson on types which were not available to him during the preparation of his manuscripts (Plate 166 fig. 5). Interestingly, in addition to the unusual condition of the expression of sexual dimorphism in *E. kuehni*, this species shows several anomalous characters with respect to other *Eudocima*, so its actual systematic placement within this genus has to be con-








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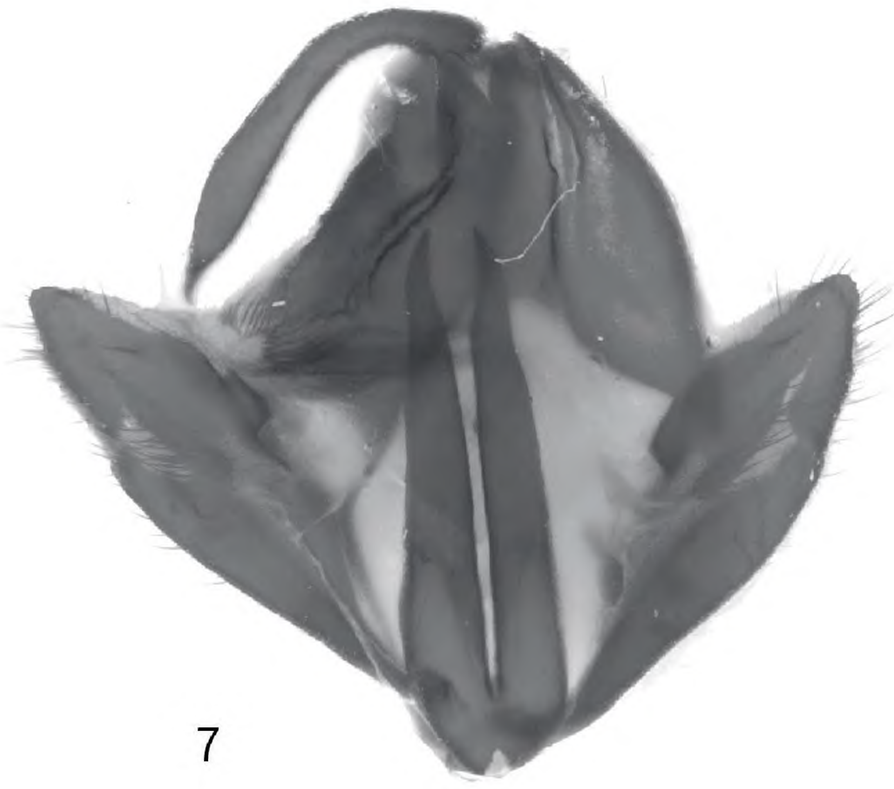
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Figures 1-5. Male genitalia of *Eudocima* species. 1-3 – *E. oliveri* sp. nov.: 1 – Holotype, genital capsula; 2 – ditto, aedeagus; 3 – Paratype, genital capsula; 4-5 –*E. phalonia* (L., 1763), Solomon Islands: 4 – Genital capsula; 5 – aedeagus.





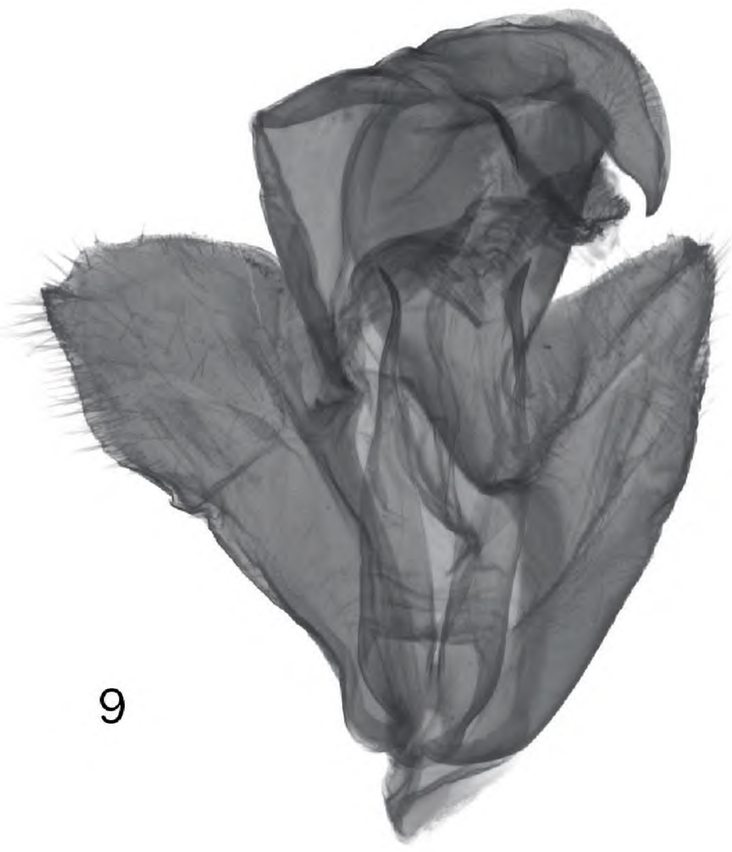
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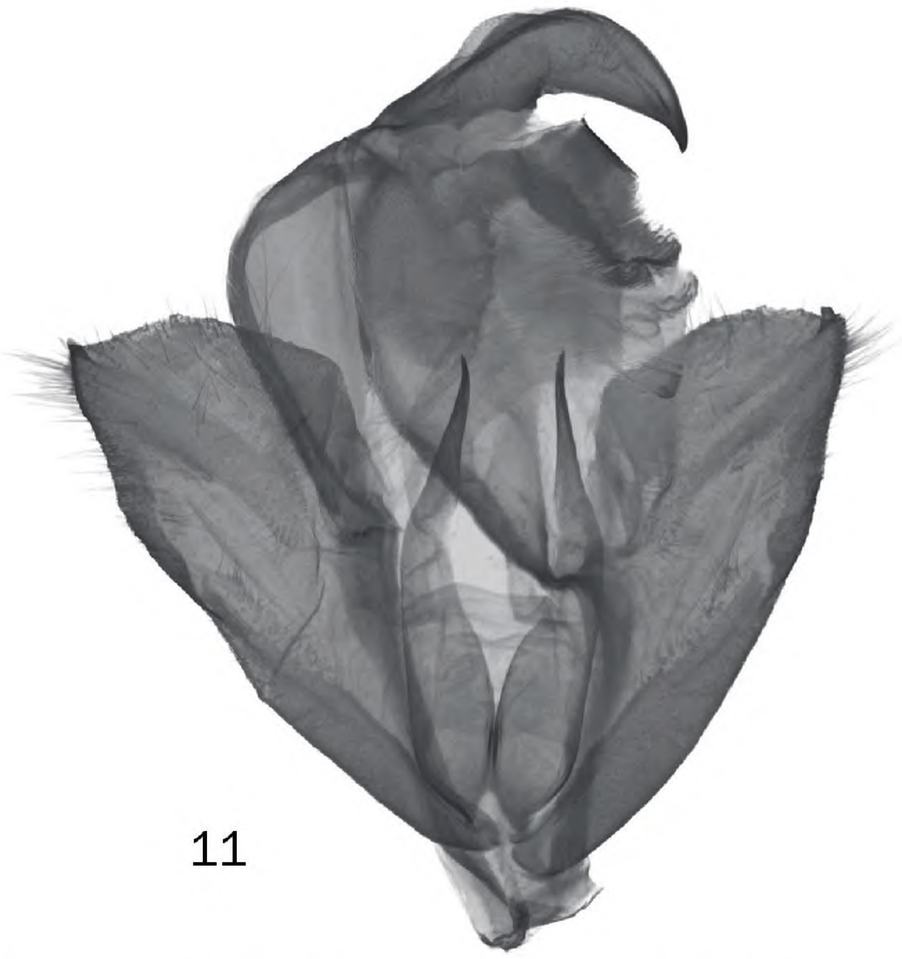
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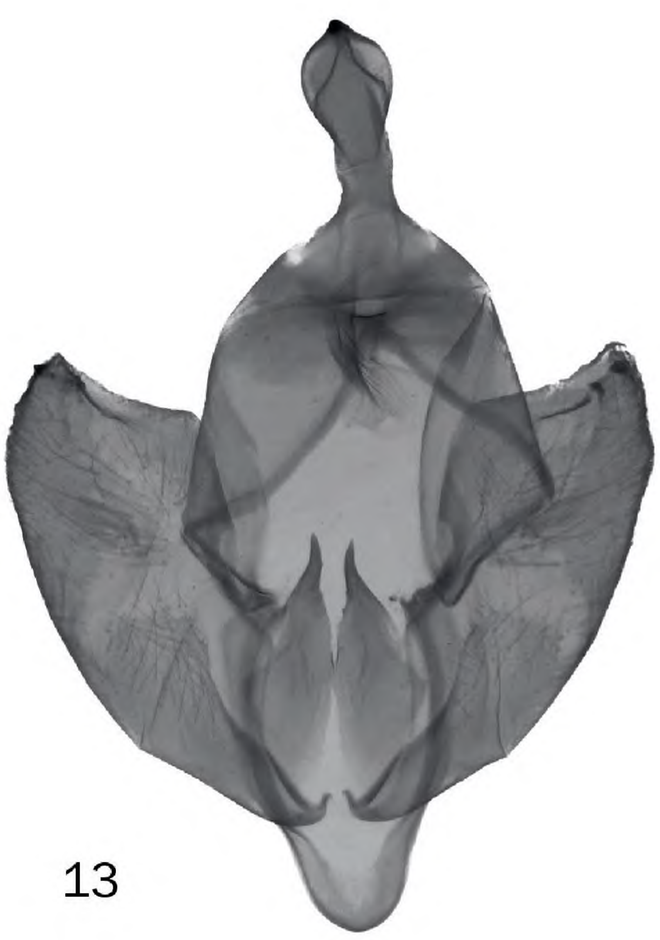
Figures 6-12. Male genitalia of *Eudocima* species. 6-8 – *E. steppingstonia* sp. nov., holotype: 6-7 – Genital capsula; 8 – Aedeagus; 9-12 –*E. talboti* (A.E. Prout, 1922): 9 – Syntype, genital capsula; 10 – ditto, aedeagus; 11 – Specimen from Mefor, genital capsula; 12 – ditto, aedeagus.



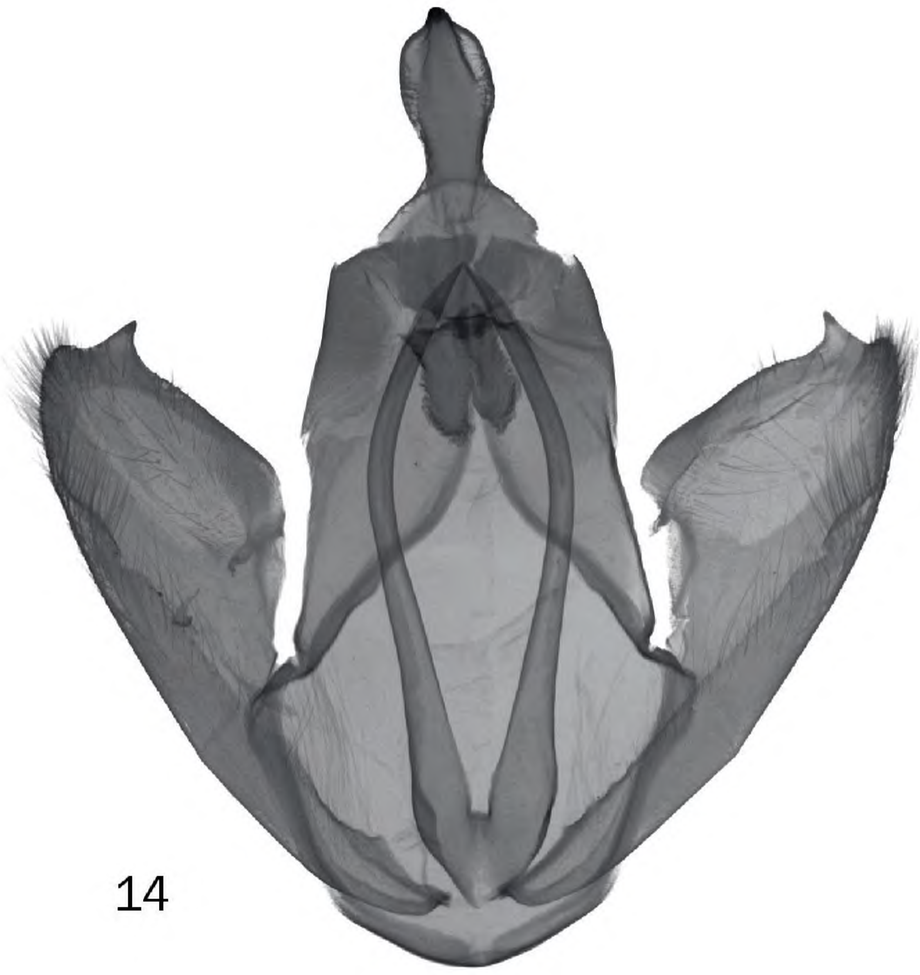








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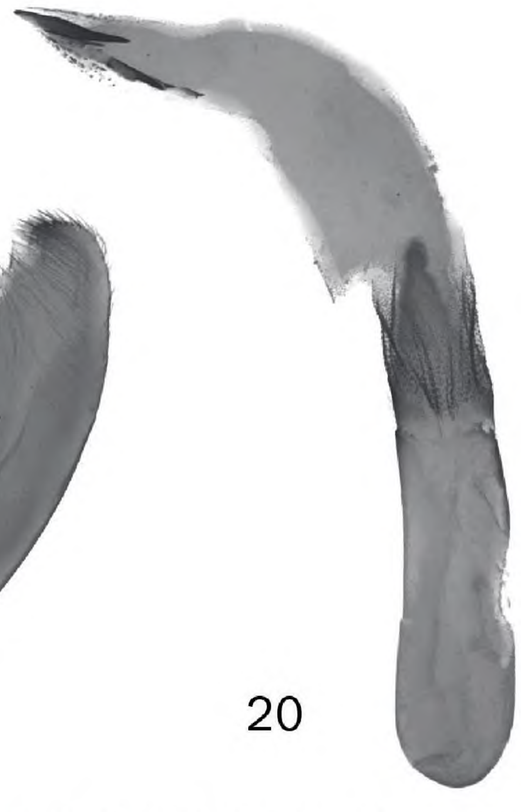
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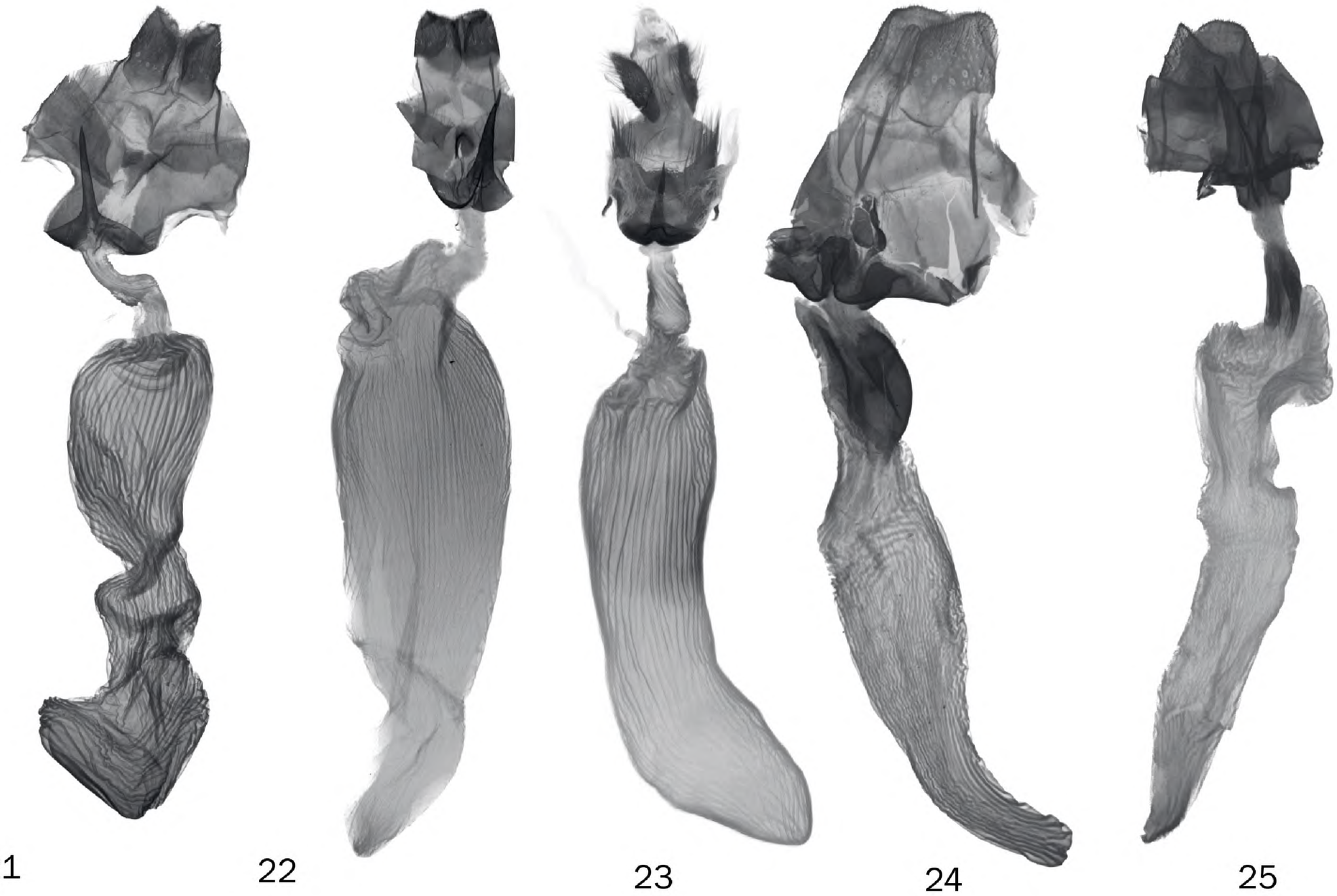


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Figures 13-20. Male genitalia of *Eudocima* species. 13 & 20 – *E. paulii* (Robinson, 1968), Fiji: 13 – Genital capsula; 20 – Aedeagus; 14-15 – *E. cajeta* (Cramer, [1775]), Sri Lanka: 14 – Genital capsula; 15 – Aedeagus; 16-17 – *E. srivijayana* (Bänziger, 1985), Sulawesi: 16 – Genital capsula; 17 – Aedeagus; 18-19 – *E. martini* sp. nov., holotype: 18 – Genital capsula; 19 – Aedeagus.



21 22 23 24 25



26 27 28 29

Figures 21-29. Female genitalia of *Eudocima* species. 21 – *E. oliveri* sp. nov., paratype; 22 – *E. phalonia* (L., 1763), Malay Peninsula; 23 – *E. steppingstonia* sp. nov., paratype; 24 – *E. talboti* (A.E. Prout, 1922), Halmahera; 25– *E. cajeta* (Cramer, [1775]), Thailand; 26 – *E. srivijayana* (Bänziger, 1985), Sumatra; 27 – *E. martini* sp. nov., paratype; 28 – *E.* cf. *martini* sp. nov. Guadalcanal; 29 – *E. paulii* (Robinson, 1968), Fiji.



sidered as temporary.
So far known from the Moluccas (Seram), Kei Islands, New Guinea, Supiori I., Rook I., New Britain, Goodenough I. and Fergusson I.

[*Eudocima princeps* Boisduval, 1832 **nomen dubium**]

Ophideres princeps Boisduval, 1832. *Voyage de découvertes de l'Astrolabe exécuté par ordre du Roi, pendant les années 1826-1827-1828-1829, sous le commandement de M. J. Dumont d'Urville. Faune entomologique de l'Ocean Pacifique 1. Lépidoptères:* 245. Type locality: Nouvelle-Guinée, environs de Dorey. Type material: unspecified, probably lost.

The contradictory combination of characters in the original description of *Ophideres princeps* by Boisduval (1832), hardly compatible with any species of *Eudocima* from the Papuan region, was thoroughly discussed by Zilli & Hogenes (2002). As a matter of fact, the name has been variously interpreted and associated with different species of *Eudocima*, also from other zoogeographical regions. In the absence of any types, the only possible solution was that of ranking the name as nomen dubium (Zilli & Hogenes, 2002). Nonetheless, Zaspel & Branham (2008) followed directly Poole (1989) and listed it again as a synonym of *phalonia*. As no new evidence in support for this interpretation has so far been found, the rationale for maintaining this as a nomen dubium is still fully in place, and we thus remove it from synonymy with *Phalaena phalonia* Linnaeus, 1763.
It should be noticed that the generic name *Ophideres* Boisduval, 1832, long used for many of the species currently treated within *Eudocima*, is based on *Ophideres princeps* after monotypy, but the fact that this is an unrecognised species has no direct bearing on nomenclature of the group as long as *Eudocima* Billberg, 1820 takes priority and there are some other older synonyms available.

Discussion and conclusion

So far 21 species of *Eudocima* have been assessed to occur from Wallacea eastwards to the Central Pacific. Contrary to the situation at the beginning of this work, the pattern of species richness of the genus in the area turned out quite more balanced between the two sides of the Australian region. In fact, at the time of Viette (1948) the open Pacific was thought to have been colonized only by three widespread species, namely *E. salaminia*, *E. phalonia* and *E. materna*. Subsequently, Robinson (1968) discovered the Fijian endemic, *E. paulii*. This one and the newly identified *E. oliveri* sp. nov. from the Vanuatu and the far eastern *E. steppingstonia* sp. nov. show that also the Pacific has its own component of richness in species of *Eudocima*. The latter two are clearly members of the *phalonia*-group, present with *E. phalonia* itself in the area, but the strongly modified structural features of *E. steppingstonia*, notably its most extraordinary uncus, demonstrate antiquity of presence of the group even in the Central Pacific. As discussed in the special part, it was also shown that the situation of nominotypical *phalonia* in the Pacific is possibly more complex than suspected so that a better knowledge of the genetic structure and relationships between the various populations of this fruit-piercing moth should better be gained. In fact, this would help more selective tuning of current control measures in the area in order to prevent that less harmful strains and, ultimately, extremely localised insular endemics such as those accounted on here will be affected.

From a biogeographical point of view worth of note is that species of *Eudocima* show a variety of distribution patterns in the Wallacean-Australian region, but there are none whose limits fully matches with Wallace's line. There are widespread, almost subcosmopolitan elements such as *E. phalonia* and *E. materna*. Also *E. salaminia* is similarly widespread, and with a greater extension into the E Palaearctic, although its presence in the Afrotropical region has never really been confirmed. There are Melanesian endemics restricted to single archipelagos (*E. oliveri*, *E. martini* and *E. paulii*), remote far Pacific relics (*E. steppingstonia*), strictly Papuan elements (*E. prolai* and *E. nigricilia*) or Papuan-centered elements extended to the Bismarck archipelago (*E. muscigera*) and Australia (*E. iridescens*).

Another Australo-Papuan element in the wide sense, *E. jordani*, actually stretches from Wallace's Line eastwards to the Bismarck Archipelago, and southwards to Northeast Australia, but it only occurs in north Wallacea (Sulawesi, Moluccas), and is actually missing in the southern district of this region. *Eudocima kuehnei* is similarly centered on the Papuan region but its range is more contracted and does not extend west of the Moluccas and in Australia. Other elements are either Moluccan, viz. *E. caesar* and *E. talboti*, although records of the latter from Waigeo and the Cenderawasih Bay make its presence in the Doberai Peninsula likely, broadly Indoaustralian (*E. cocalus*, *E. aurantia*, the latter also in the SE Palaearctic) or essentially oriental species which extend into Wallacea albeit only in part,






viz. *E. discrepans*, *E. homaena*, *E. srivijayana* and *E. dividens*. It should be stressed, however, that after its current appreciation the genus is possibly heterogeneous, with several lineages sometimes corresponding with the old generic concepts of its synonymous names, whose phylogenetic relationships should be assessed. This analysis would be required in order to properly appreciate radiation of the group in the study area. Preliminarly, if we consider species pairs or groups of clearly related taxa, they usually show strict vicariance patterns. This is the case within the pairs *E. discrepans-E. muscigera* and *E. hypermnestra-E. cocalus* (but see comments in the special section to the latter), or the almost geographically regular substitutions which take place among *E. cajeta*, *E. srivijayana* and *E. talboti* or *E. homaena*, *E. caesar* and *E. iridescens*. In two cases we seem to have full overlap between related species, they are *E. salaminia* and *E. nigricilia* in New Guinea and *E. oliveri* and *E. phalonia* in the Vanuatu. In the latter instance, however, we still need final probation of the various islands on which the two actually coexist. Diversification has thus seemingly followed either allo-parapatric or sympatric models, pathways which can both be traced also in the differentiation shown by *E. salaminia* and *E. phalonia* in the Solomon archipelago. Environmental heterogeneity such as in New Guinea or multi-colonization events such as in the case of smaller islands are the most likely determinants of sympatric occurrences of close allies.

Despite our insights into all species from the Wallacean-Australian region the identity of the original concept of *Ophideres princeps* Boisduval, 1832 unfortunately remains in doubt, nonetheless that of another long standing nomen dubium, *Ophideres caesar* C. Felder, 1861, could eventually be resolved following the discovery of a so far unrecognised syntype.

Acknowledgements

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***sahu**, Macratria* 482
***sangirensis**, Aprosictus* 341
***sanguinea**, Ophiotettix* 570
***schapinae**, Ophiotettix* 571
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***semiflavum**, Porrostoma* 400
***separanda**, Moussonia* 198
***sexpunctatus**, Aprosictus* 342
***sigwaltae**, Missacoris* 77
***silvicultrix**, Palaina* (s. l.) 259
***simonthomasi**, Cyana (Clerckia)* 595
***slapcinskyi**, Diplommatina* (s. l.) 184
***slapcinskyi**, Palaina* (s. l.) 260
***soleae**, Orphinus* (s. str.) 318
***solitaria**, Amystrops (Amystrops)* 405
***sparselamellata**, Palaina* (s. l.) 262
***spungisi**, Argiolestes* 358
***stallei**, Ophiotettix* 572
***steppingstonia**, Eudocima* 635
***storozhenkoi**, Ophiotettix* 573
***strigicollis**, Phainodina* 420
***subbrevicollis**, Ophiotettix* 574









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tanimbarensis, *Palaina* (s. l.) 263
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telnovi, *Diplommatina* (s. l.) 186
telnovi, *Endelus* (*Papuadelus*) 350
telnovi, *Epuraea (Haptoncus)* 404
telnovi, *Palaina* (s. l.) 263
telnovi, *Pyrrhalta* 421
telnovi, *Scaphisoma* 415
telnovi, *Stethotes* 420
telnovi, ***C****oenobius* 419
tenuis, *Ophiotettix* 575
ternatensis, *Aprosictus* 343
tertius, *Cladophorus* 381
thomasrinteleni, *Palaina* (s. l.) 264
thoracica, *Phainodina* 421
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tricoloripennis, *Cautires* 392
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weigeli, *Cladophorus* 379

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zhengi, *Sabactiopus* 109
zwieri, *Cyana (Cryptanaema)* 602






Plate 1

SHEA, G.M.: The identity of *Lygosoma (Hinulia) misolense* Vogt, 1928 (Squamata: Scincidae)



1

2

3

Figures 1-3. *Lygosoma misolense* Vogt, 1928. 1 – Lectotype (ZMB 31523); 2 – Paralectotype (ZMB 64387); 3 – Details of dorsal and dorsolateral scalation of the paralectotype.



Figure 1. Holotype of *Lygosoma inconspicuum* F. Müller, 1895: NHMB 4742.



1



2

Figures 1-2. Scincid lizards from Wallacea. 1 – Details of ventral surface of right hind foot and preanal region of holotype of *Lygosoma inconspicuum* F. Müller, 1895; 2 – One of the three extant syntypes of *Lygosoma (Mocoa) noctua* var. *ternatensis* Peters, Doria, 1878. All three syntypes are registered under the number MSNG 27976, and are not individually tagged.



Figures 1-2. *Sphenomorphus dekkerae* sp. nov. 1 – Paratype; 2 – Holotype.



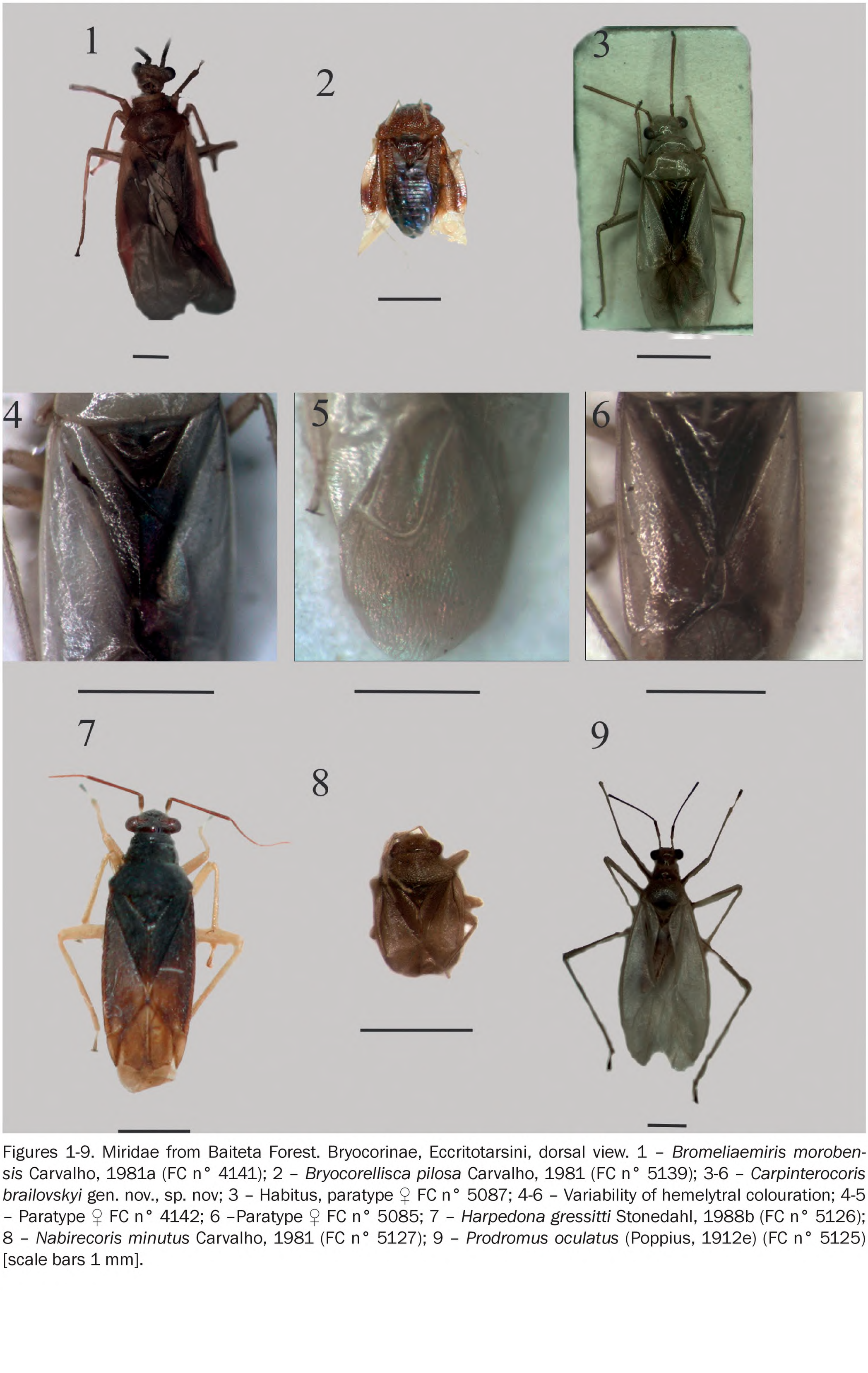
Figures 1-2. *Sphenomorphus consobrinus* (Peters, Doria, 1878). 1 – One of the syntypes (MSNG 27875) from "Batjan" (Pulau Bacan); 2 – Specimen from Halmahera (SMF 14458).



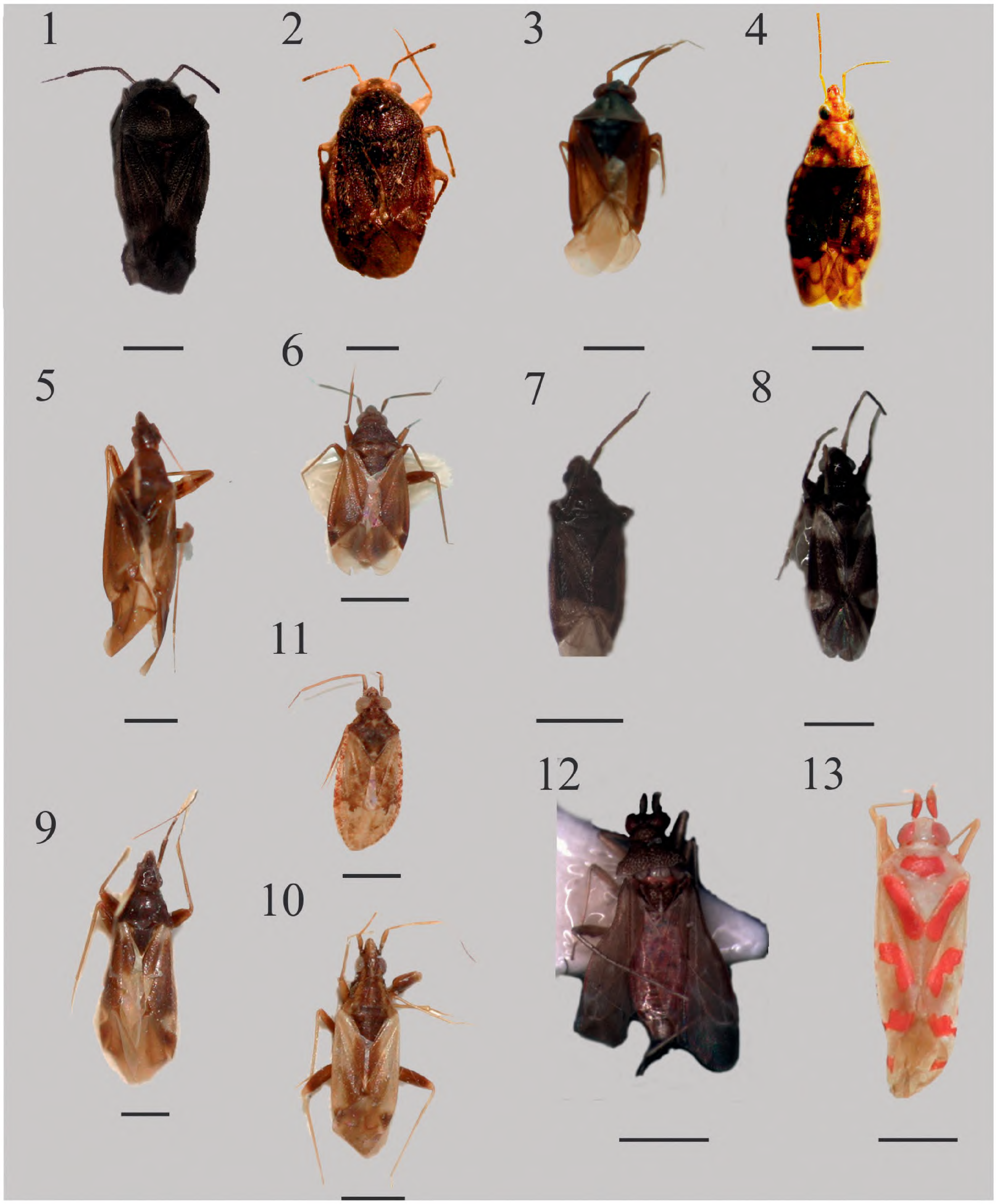
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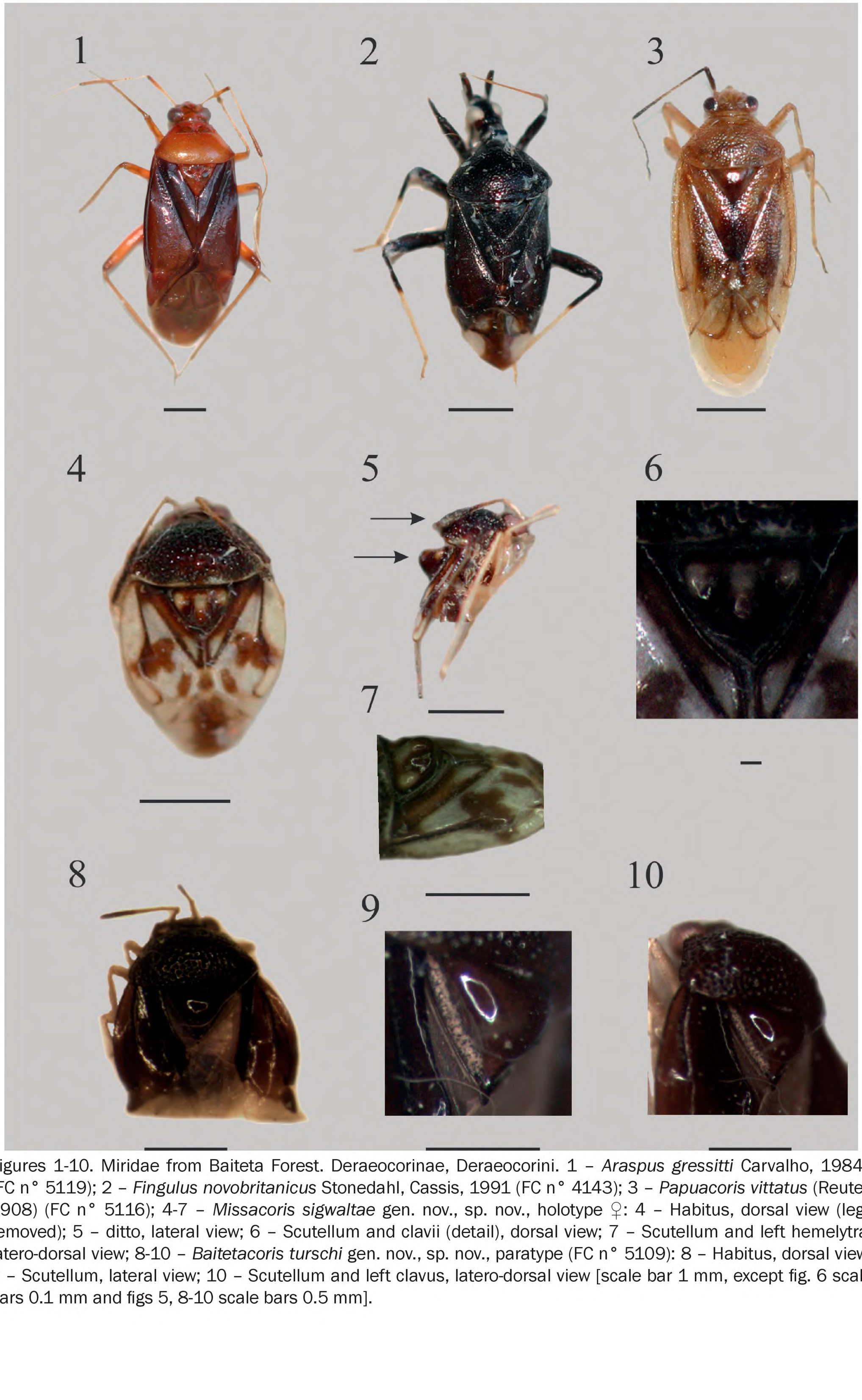
Figures 1-2. Dense low dry sclerophyll forest of the Ayamaru area on Doberai Peninsula, West New Guinea (photos: D. Telnov, 2015).



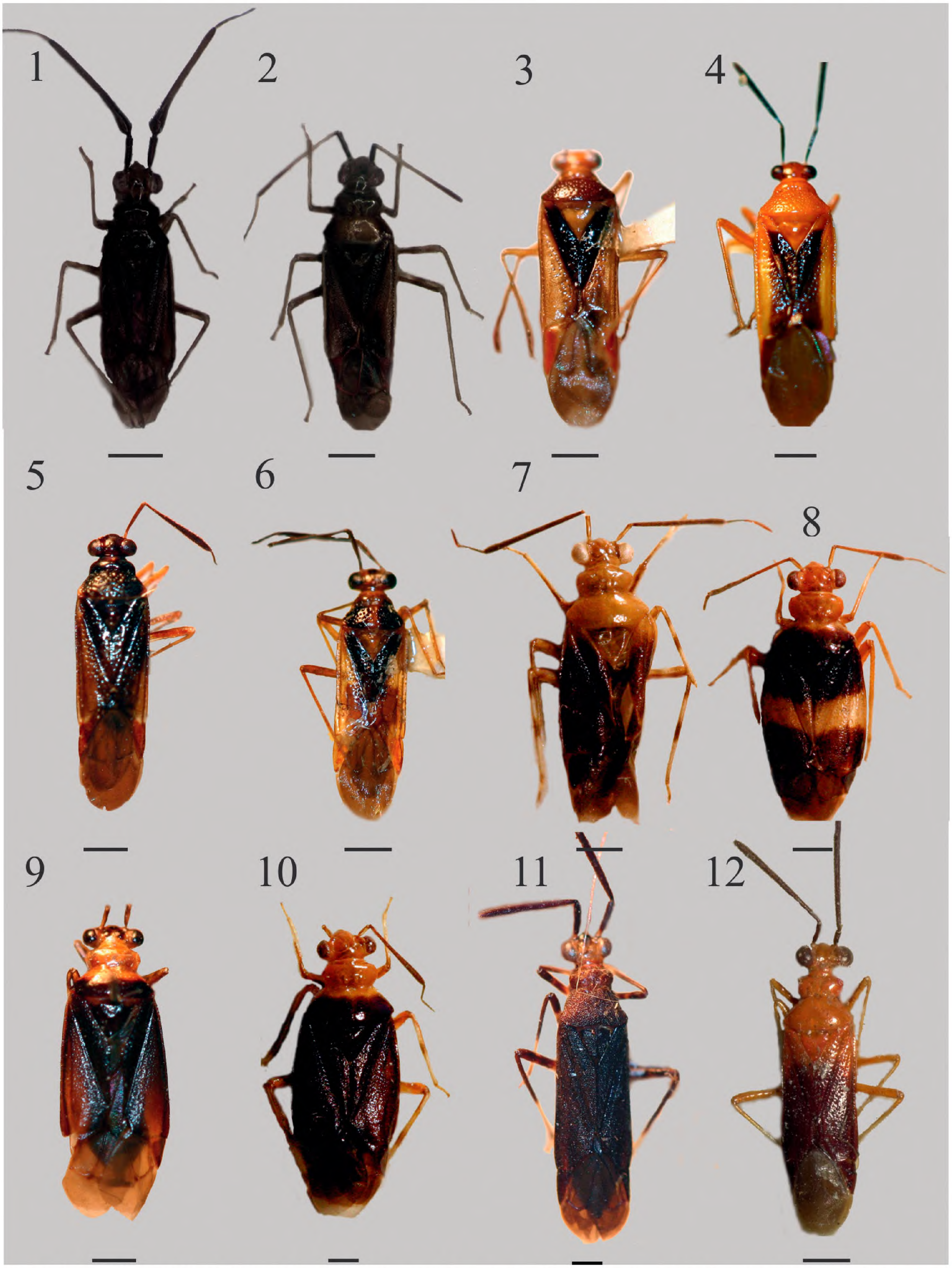
Figures 1-9. Miridae from Baiteta Forest. Bryocorinae, Eccritotarsini, dorsal view. 1 – *Bromeliaemiris morobensis* Carvalho, 1981a (FC n° 4141); 2 – *Bryocorellisca pilosa* Carvalho, 1981 (FC n° 5139); 3-6 – *Carpinterocoris brailovskyi* gen. nov., sp. nov; 3 – Habitus, paratype ♀ FC n° 5087; 4-6 – Variability of hemelytral colouration; 4-5 – Paratype ♀ FC n° 4142; 6 –Paratype ♀ FC n° 5085; 7 – *Harpedona gressitti* Stonedahl, 1988b (FC n° 5126); 8 – *Nabirecoris minutus* Carvalho, 1981 (FC n° 5127); 9 – *Prodromus oculatus* (Poppius, 1912e) (FC n° 5125) [scale bars 1 mm].



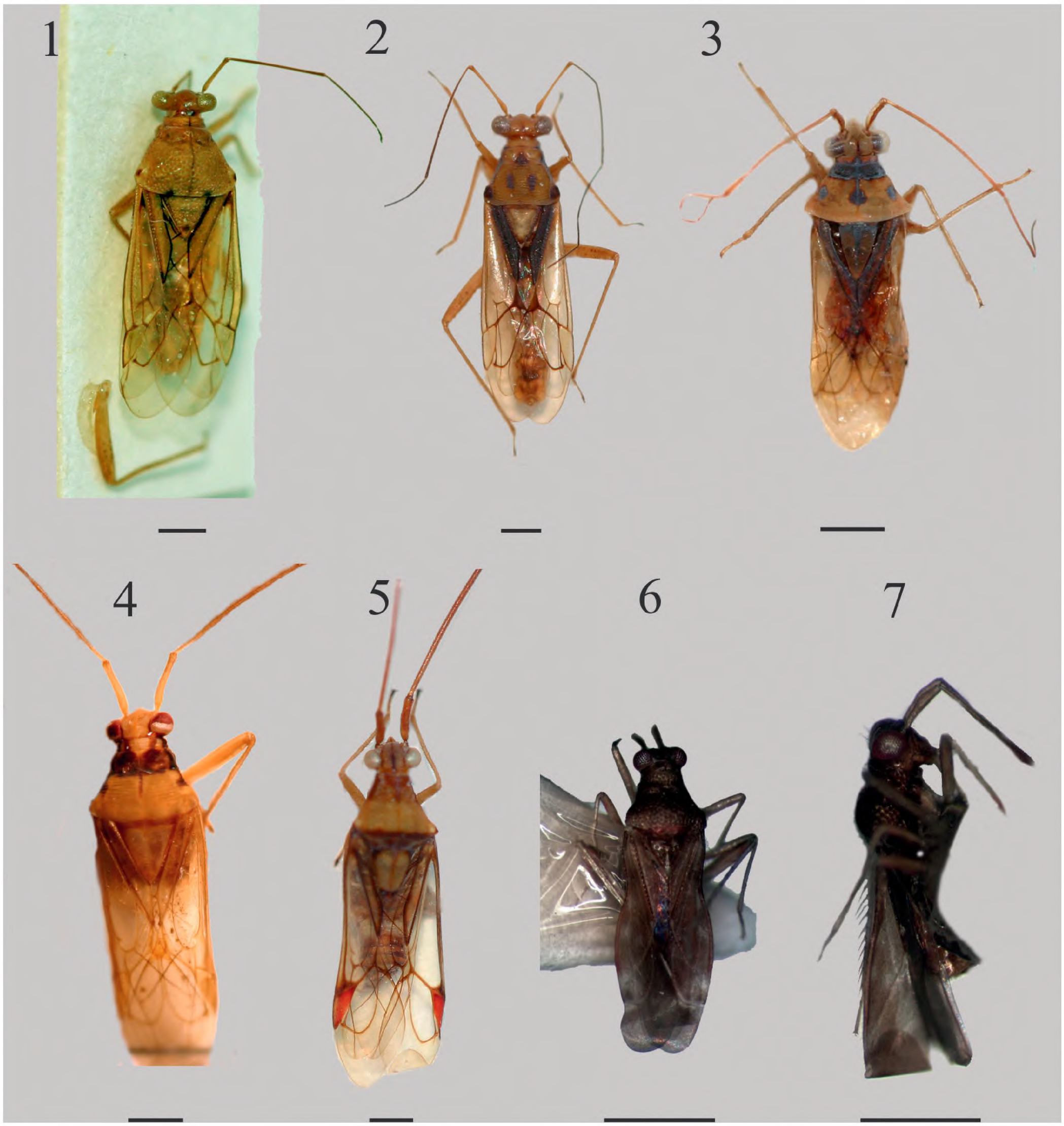
Figures 1-13. Miridae from Baiteta Forest. Cylapinae, dorsal view. 1 – *Bakeriola* sp. FC n 5121; 2 – *Bothriomiris* sp. (FC n° 4162); 3 – *Bironiella metallescens* Poppius, 1909 (FC n° 5075a); 4 – *Cylapofulvius punctatus* Poppius, 1909, lectotype ♂; 5 – *Fulvius constanti* Gorczyca, 2004 (FC n° 4175); 6 – *Fulvius nigricornis* Poppius, 1909 (FC n°4176); 7 – *Fulvius pallidus* Poppius, 1909 (FC n° 4168); 8 – *Fulvius stysi* Chérot, Gorczyca, 2008, paratype (FC n° 5140); 9 – *Fulvius subnitens* Poppius, 1909 (FC n° 4165); 10 – *Fulvius variegatus* Poppius, 1909 (FC n° 4162); 11 – *Peritropis sulawesica* Gorczyca, 2006b; 12 – *Palaucoris novaguineae* (Ghauri, 1975) (FC n°5079); 13 – *Vanniusoides brevis* (Poppius, 1909) (FC n° 5139) [scale bars 1 mm].



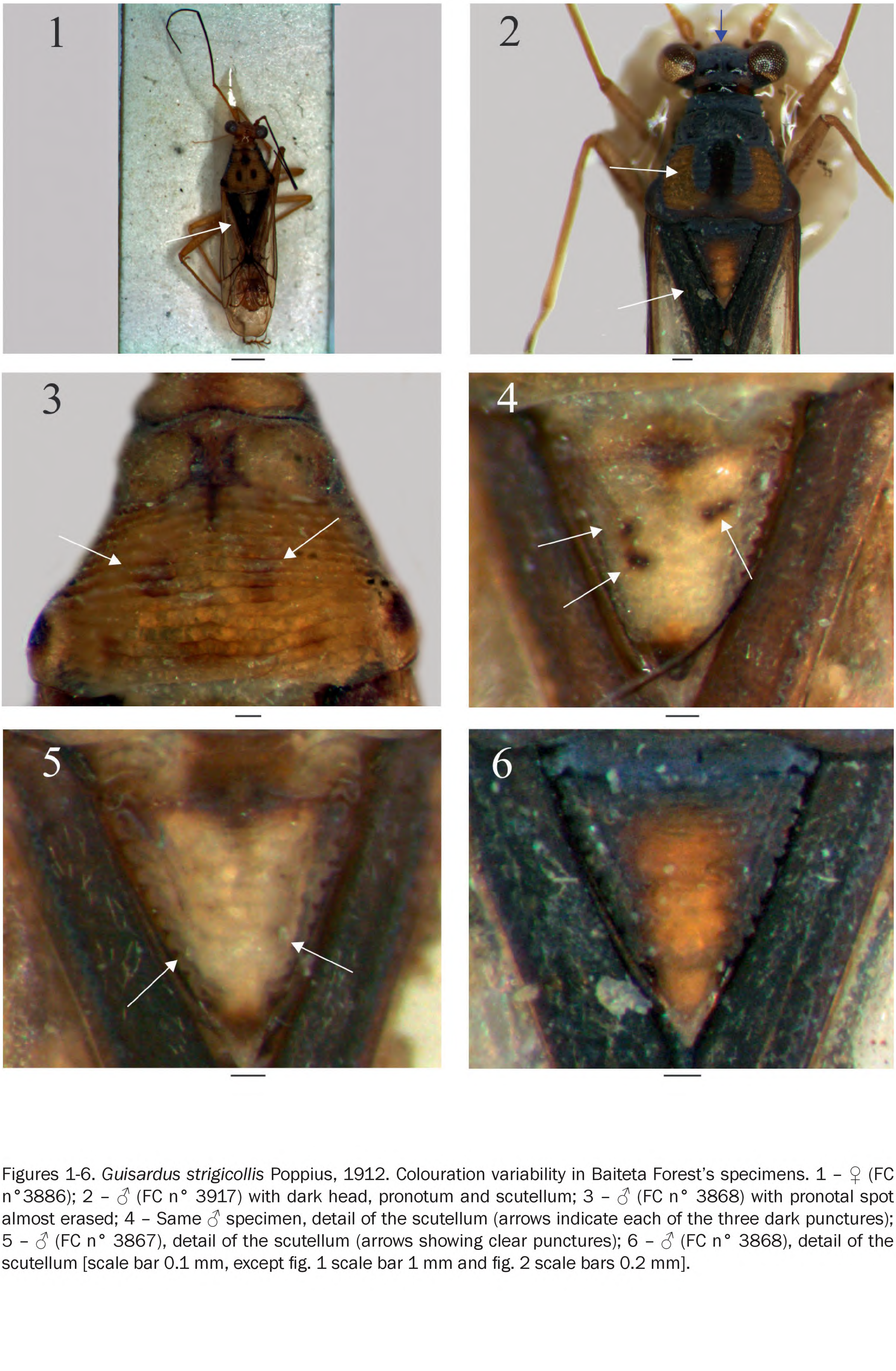
Figures 1-10. Miridae from Baiteta Forest. Deraeocorinae, Deraeocorini. 1 – *Araspus gressitti* Carvalho, 1984a (FC n° 5119); 2 – *Fingulus novobritanicus* Stonedahl, Cassis, 1991 (FC n° 4143); 3 – *Papuacoris vittatus* (Reuter, 1908) (FC n° 5116); 4-7 – *Missacoris sigwaltae* gen. nov., sp. nov., holotype ♀: 4 – Habitus, dorsal view (legs removed); 5 – ditto, lateral view; 6 – Scutellum and clavii (detail), dorsal view; 7 – Scutellum and left hemelytra, latero-dorsal view; 8-10 – *Baitetacoris turschi* gen. nov., sp. nov., paratype (FC n° 5109): 8 – Habitus, dorsal view; 9 – Scutellum, lateral view; 10 – Scutellum and left clavus, latero-dorsal view [scale bar 1 mm, except fig. 6 scale bars 0.1 mm and figs 5, 8-10 scale bars 0.5 mm].



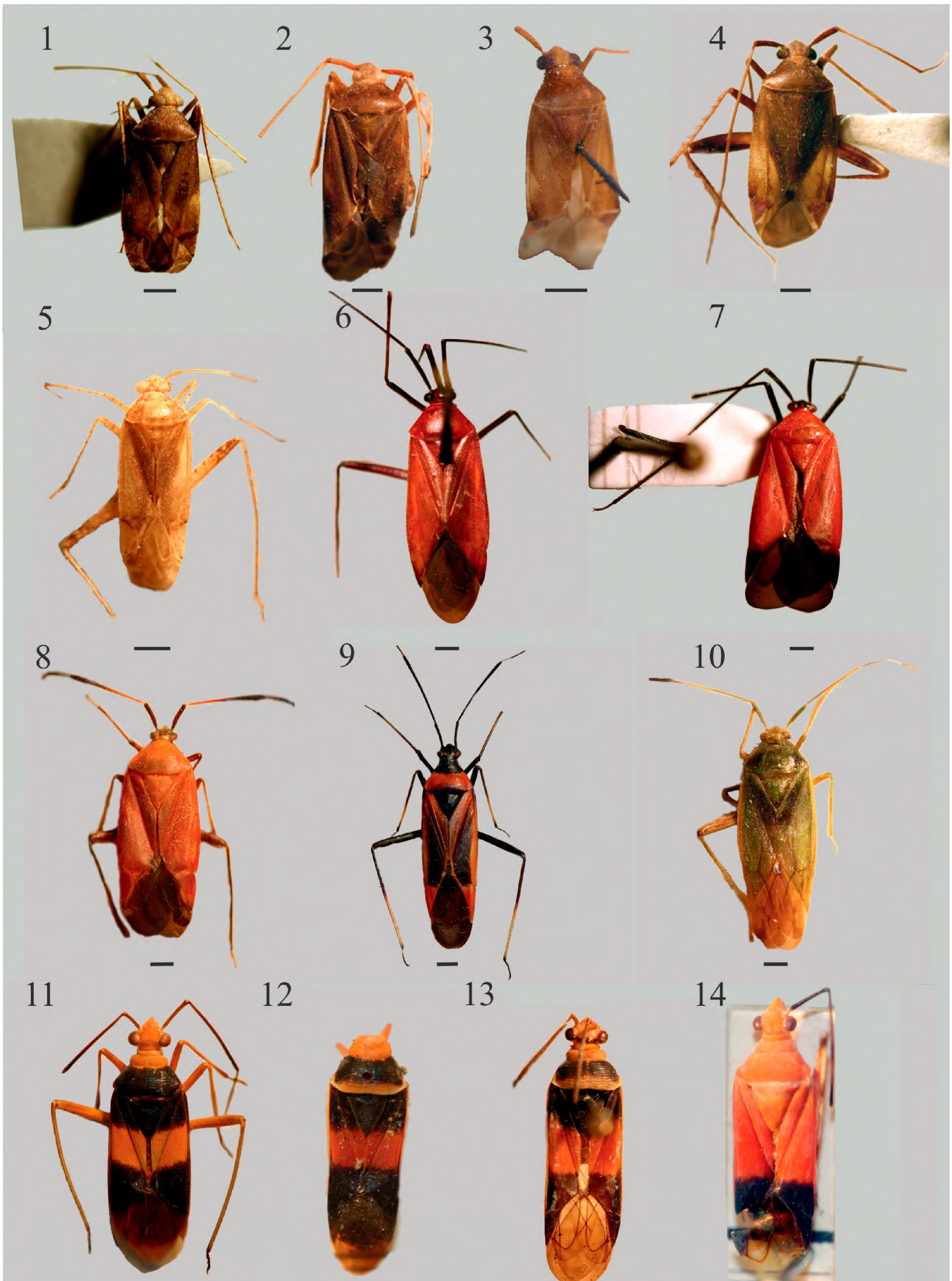
Figures 1-12. Miridae from Baiteta Forest with several taxa examined for comparison. Deraeocorinae, Saturniomirini, dorsal view. 1-2 – *Garainamiris antennatus* Carvalho, 1981b, ♂ (FC n° 4154) and ♀ (FC n° 4151); 3 – *Cheesmaniella clavonigra* Carvalho, 1984 (FC n° 4212); 4 – *Cheesmaniella fasciata* Carvalho, 1984 (FC n° 4211); 5 – *Cheesmaniella nigra* Carvalho, 1984 (FC n° 4210); 6 – *Cheesmaniella notomaculata* Carvalho, 1984 (FC n° 4209); 7 – *Imogen bicolor* (Poppius, 1912b) (FC n° 4146); 8 – *Imogen fasciatus* Carvalho, 1983 (FC n° 4144); 9 – *Imogen formosa* Kirkaldy, 1905 (FC n° 4206); 10 – *Imogen papuensis* Carvalho, 1983 (FC n° 4145); 11 – *Saturniomiris lugens* (Walker, 1873) (FC n° 4208); 12 – *Synthlipsis ternatensis* (Distant, 1904), syntype (FC n° 5353) [scale bars 1 mm].



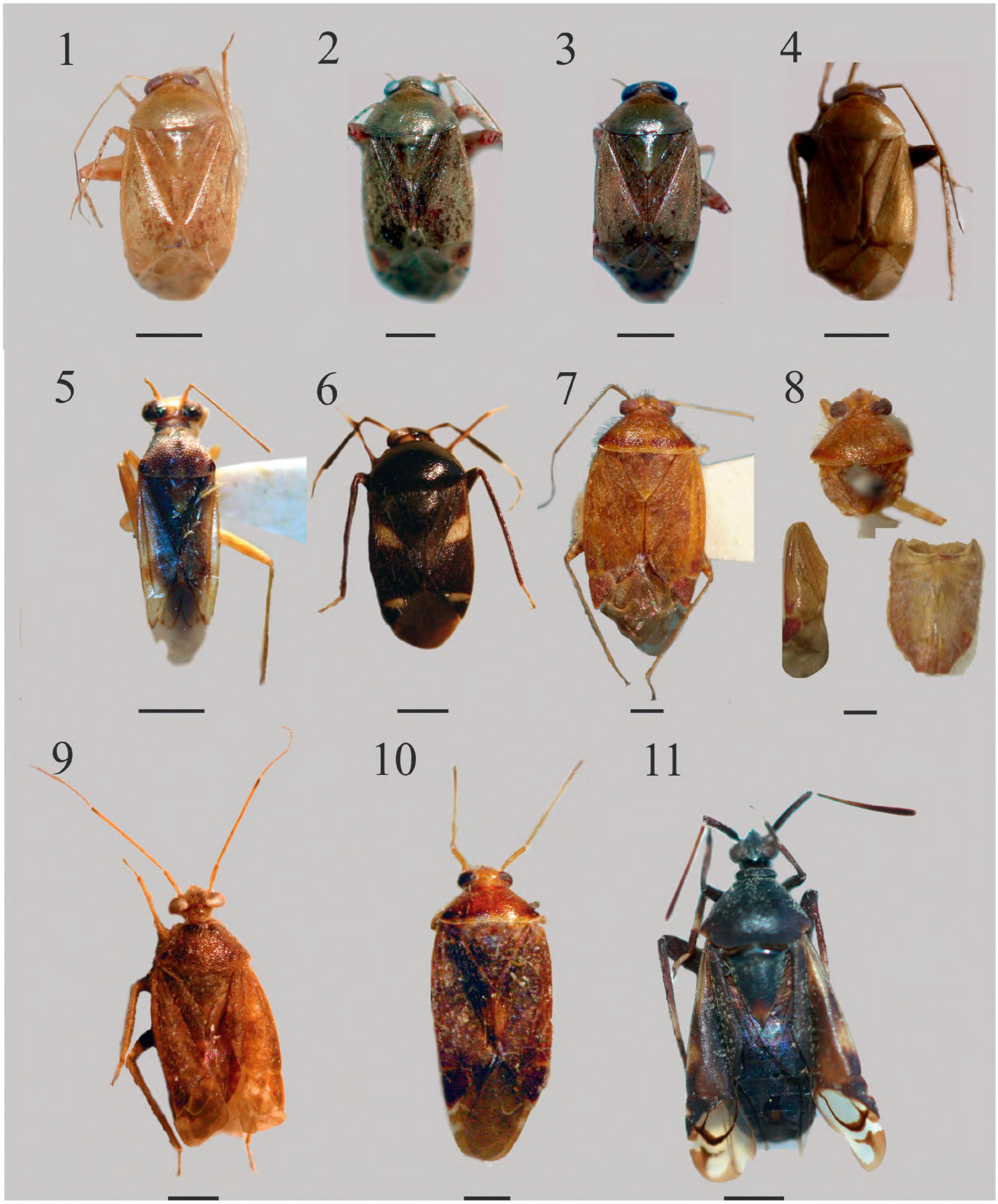
Figures 1-7. Miridae from Baiteta Forest. Mirinae Hyalopeplini and Cylapinae Vanniini, dorsal view. 1 – *Guisardinus neoguineanus* Carvalho in Carvalho et Gross, 1979 (FC n° 3853); 2 – *Guisardus strigicollis* Poppius, 1912a (FC n° 3937); 3 – *Hyalopeplinus papuensis* Carvalho in Carvalho et Gross, 1979 (FC n° 3832); 4 – *Hyalopeploides cyanescens* Poppius, 1912a (FC n° 351); 5 – *Hyalopeplus similis* Poppius, 1912c (FC n° 3833); 6-7 – *Palaucoris novaguineae* (Ghauri, 1975): 6 – Habitus, dorsal view (FC n°5080); 7 – ditto, lateral view (FC n° 5082) [scale bars 1 mm].



Figures 1-6. *Guisardus strigicollis* Poppius, 1912. Colouration variability in Baiteta Forest's specimens. 1 – ♀ (FC n°3886); 2 – ♂ (FC n° 3917) with dark head, pronotum and scutellum; 3 – ♂ (FC n° 3868) with pronotal spot almost erased; 4 – Same ♂ specimen, detail of the scutellum (arrows indicate each of the three dark punctures); 5 – ♂ (FC n° 3867), detail of the scutellum (arrows showing clear punctures); 6 – ♂ (FC n° 3868), detail of the scutellum [scale bar 0.1 mm, except fig. 1 scale bar 1 mm and fig. 2 scale bars 0.2 mm].

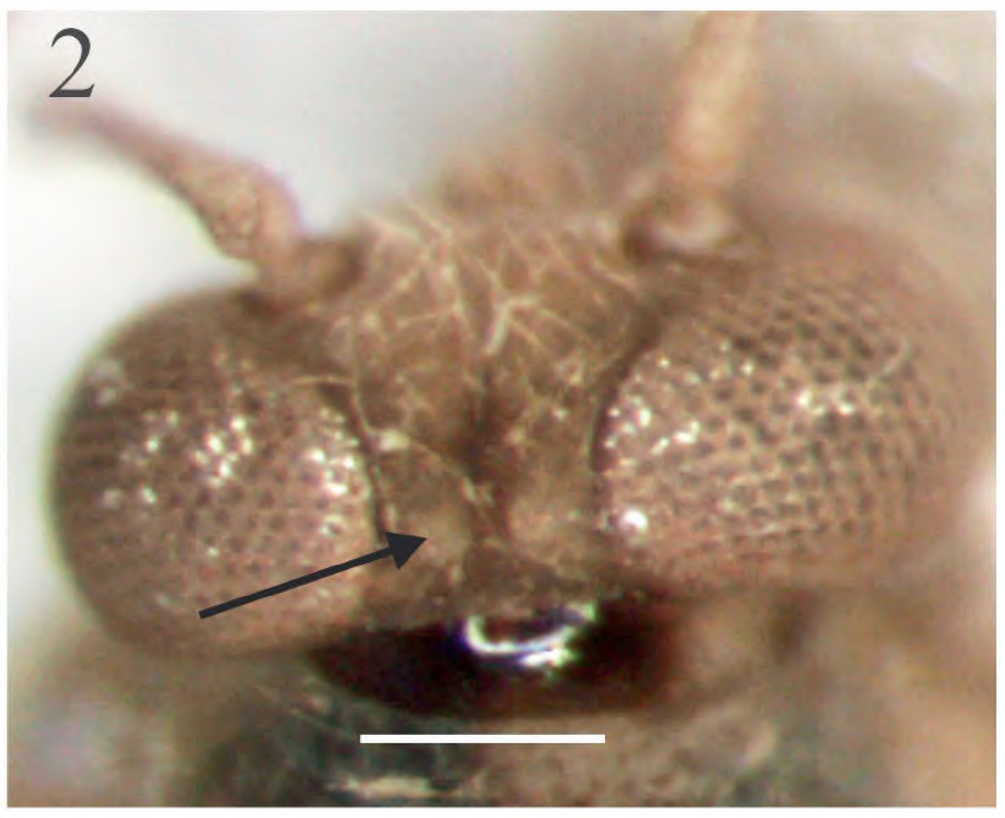


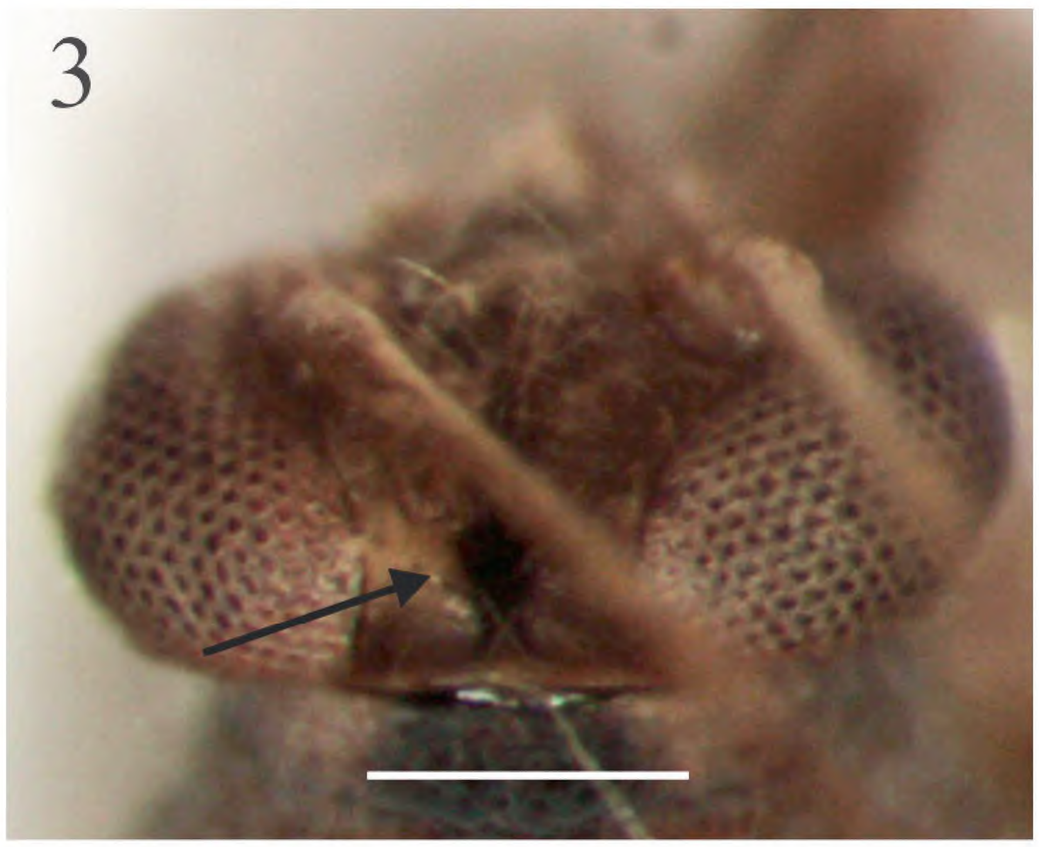
Figures 1-14. Miridae from Baiteta Forest with several taxa examined for comparison. Mirinae, Mirini, dorsal view. 1-4 – *Adelphocorisella brunnescens* (Poppius, 1915a): 1 – ♂ (FC n° 3839); 2 – ♀ FC n° 268; 3 – Holotype ♂ from Simbang, Huon Golf (ZMHF); 4 – ♀ (FC n° 4263); 5 – *Adelphocorisella lespedezae* Miyamoto, Yasunaga, 1993, paratype ♀ (FC n° 204); 6-7 – *Macrolygus rubrus* (Carvalho, 1987b): 6 –Paratype ♂ (FC n° 4259); 7 – ♂ (FC n° 3850); 8 – *Miyamotoa rubicunda* Yasunaga, 1990, paratype ♀ (FC n° 223); 9 – *Gigantomiris jupiter* Miyamoto, Yasunaga, 1988, ♂ (FC n° 219); 10 – *Macrolygus viridulus* Yasunaga, 1992, ♀ (FC n° 230); 11 – *Aristopeplus imperialis* Poppius, 1912a, ♀ (FC n° 3852); 12-13 – *Aristopeplus divisus* (Walker, 1873), holotype ♂ (FC n° NE14) and ♀ (FC n° 1317) respectively; 14 – *Aristopeplus regalis* Poppius, 1912, lectotype ♀ (FC n° 4934) [scale bars 1 mm].



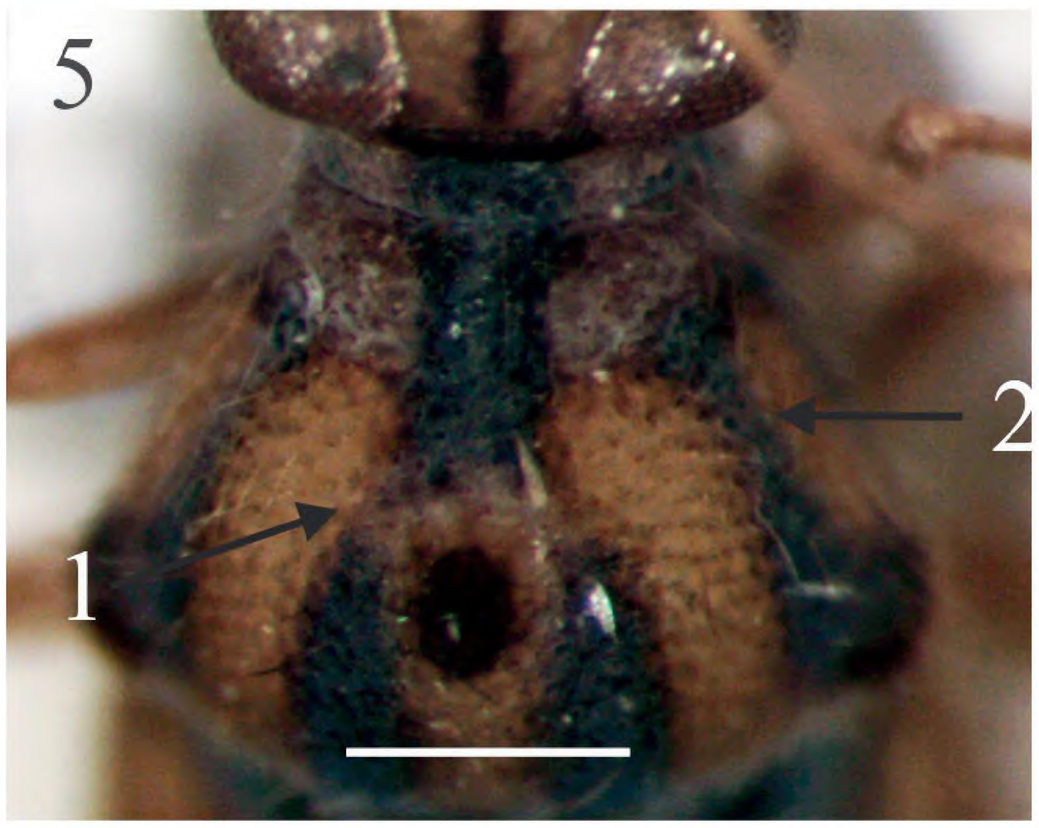
Figures 1-11. Miridae from Baiteta Forest with several taxa examined for comparison. Mirinae, Mirini. 1-3 – *Prolygus ehannoi* sp. nov., variability in patches extension and shape, dorsal view: 1 – Paratype ♀ (FC n° 4027); 2 – Paratype ♀ (FC n° 4019); 3 – Paratype ♂ (FC n° 4018); 4 – *Prolygus polhemusorum* sp. nov., paratype, dorsal view FC n° 4015; 5 – *Argenis incisuratus* (Walker, 1873), dorsal view (FC n° 4413); 6 – *Bertsa lankana* (Kirby, 1891) (FC n° 3894); 7-9 – *Diognetus intonsus* Distant, 1904c, dorsal view: 7 – Lectotype ♀; 8 – Lectotype ♀ of *Diognetus literatus* (Distant, 1909b) syn. nov., head, left hemelytra and abdomen, ventral view; 9 – ♂ (FC n° 3989) from Baiteta Forest, dorsal view; 10 – *Diognetus pilosus* (Poppius, 1914a), holotype ♀ of *G. pilosa* comb. nov. FC n° 935, dorsal view; 11 – *Eurystylus costalis* Stål, 1871, dorsal view (FC n° 4014a) [scale bars 1 mm].

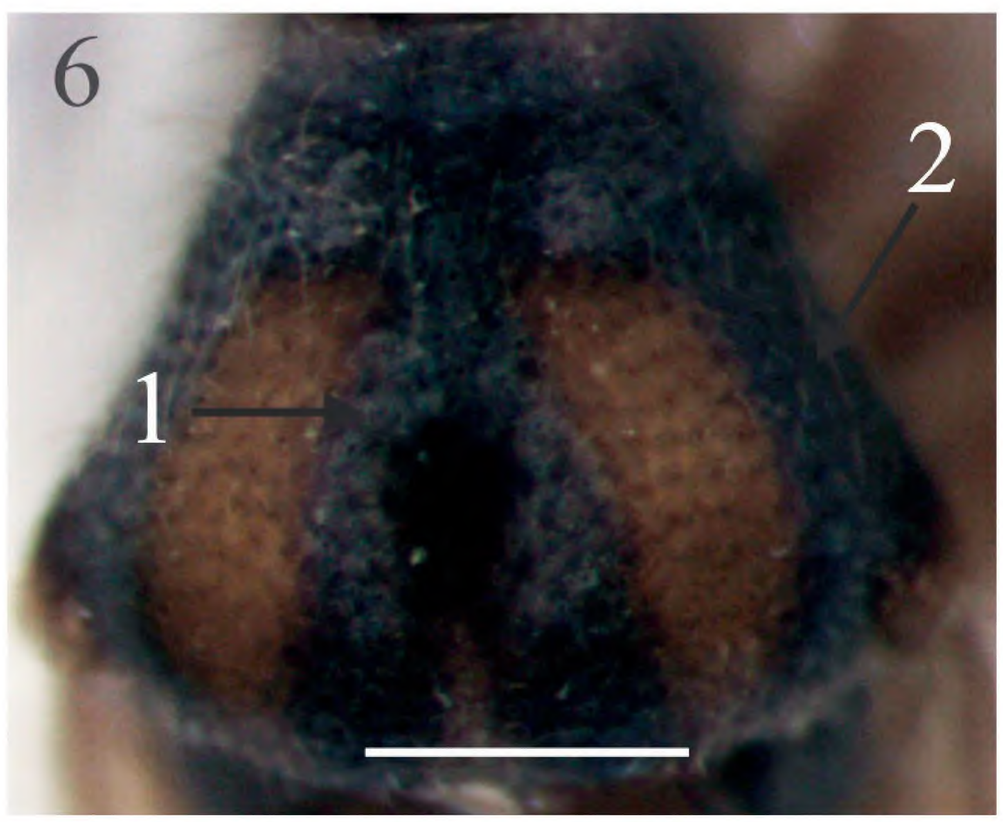




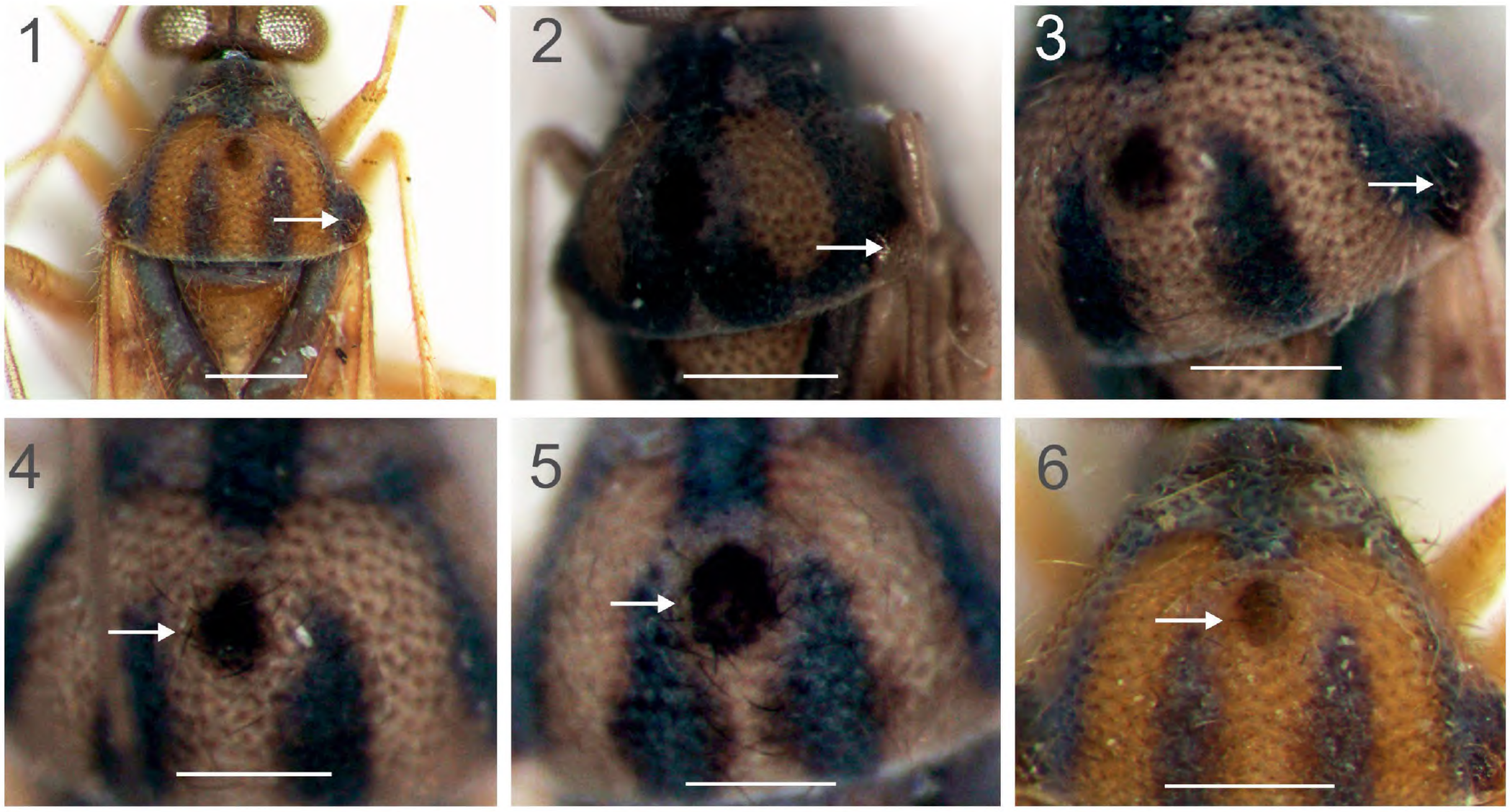




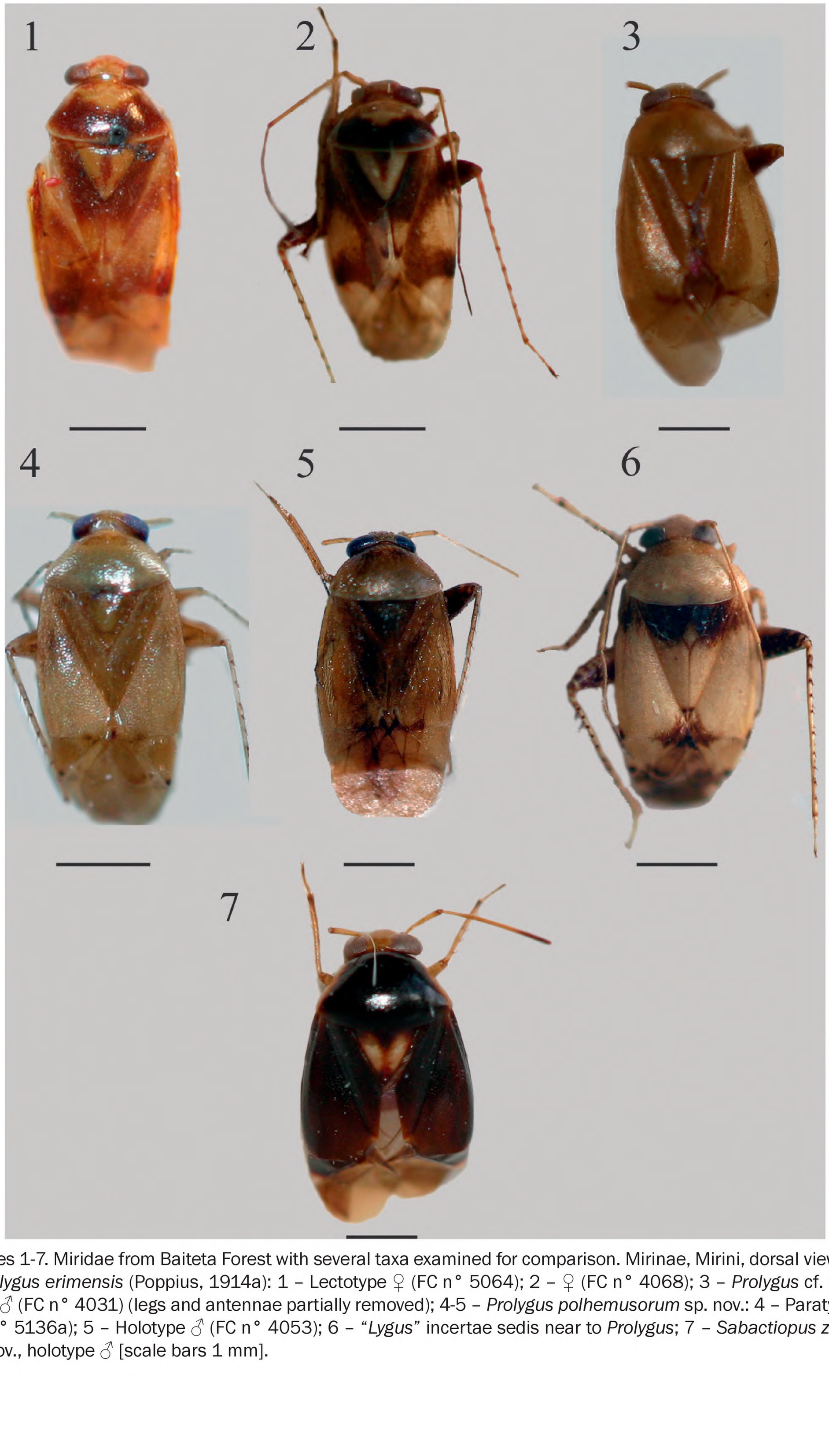




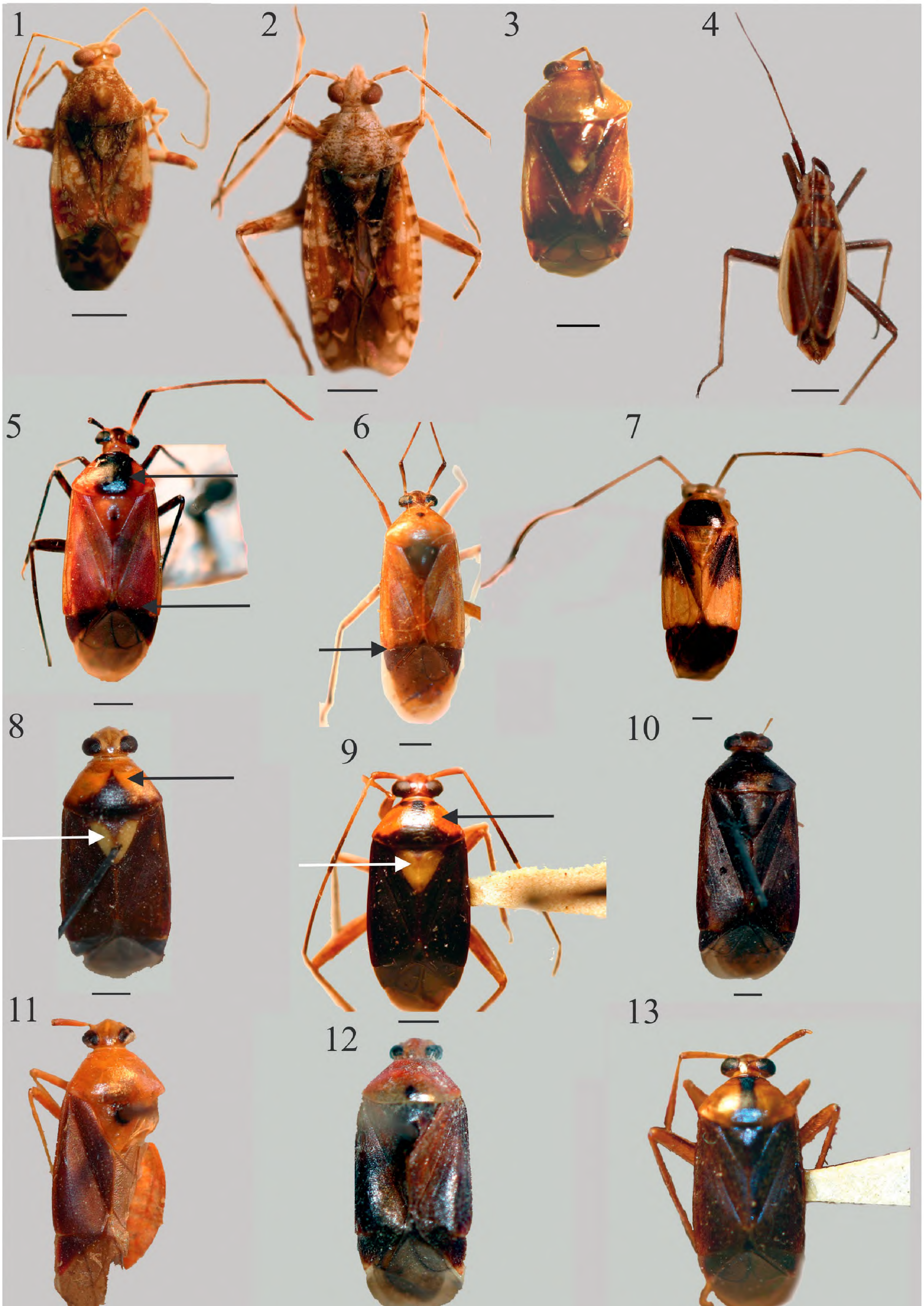
Figures 1-6. Variability of several character states in *Argenis incisuratus* (Walker, 1873) from Baiteta Forest (see text for details). 1-3 – Coloration of dorsal surface of head: 1 – ♂ (FC n° 3815); 2 – ♂ (FC n° 3810); 3 – ♂ (FC n° 3816) [scale bar 1 mm]; 4-6 – Colouration of pronotum: 4 – ♂ (FC n° 3799); 5 – ♀ (FC n° 4011); 6 – ♂ (FC n° 3798) [scale bars 0.5 mm].



Figures 1-9. Variability of several character states in *Argenis incisuratus* (Walker, 1873) from Baiteta Forest (see text for details). 1-3 – Development and colouration of globose humeral angles of pronotum: 1 – ♂ (FC n° 4009); 2 – Specimen of unknown sex (FC n° 3814); 3 – ♂ (FC n° 3800); 4-6 – Development and colouration of pronotal hump: 4 – ♂ (FC n° 3800); 5 – ♂ (FC n° 3806); 6 – ♂ (FC n°4009); 7-9 – Development of silvery patches of clavus; 7– ♂ (FC n° 3800); 8 – Specimen of unknown sex (FC n° 3814); 9 – ♂ (FC n° 3825) [scale bars 0.5 mm].



Figures 1-7. Miridae from Baiteta Forest with several taxa examined for comparison. Mirinae, Mirini, dorsal view. 1-2 – *Prolygus erimensis* (Poppius, 1914a): 1 – Lectotype ♀ (FC n° 5064); 2 – ♀ (FC n° 4068); 3 – *Prolygus* cf. *femoralis*, ♂ (FC n° 4031) (legs and antennae partially removed); 4-5 – *Prolygus polhemusorum* sp. nov.: 4 – Paratype ♀ (FC n° 5136a); 5 – Holotype ♂ (FC n° 4053); 6 – "*Lygus*" incertae sedis near to *Prolygus*; 7 – *Sabactiopus zhengi* sp. nov., holotype ♂ [scale bars 1 mm].



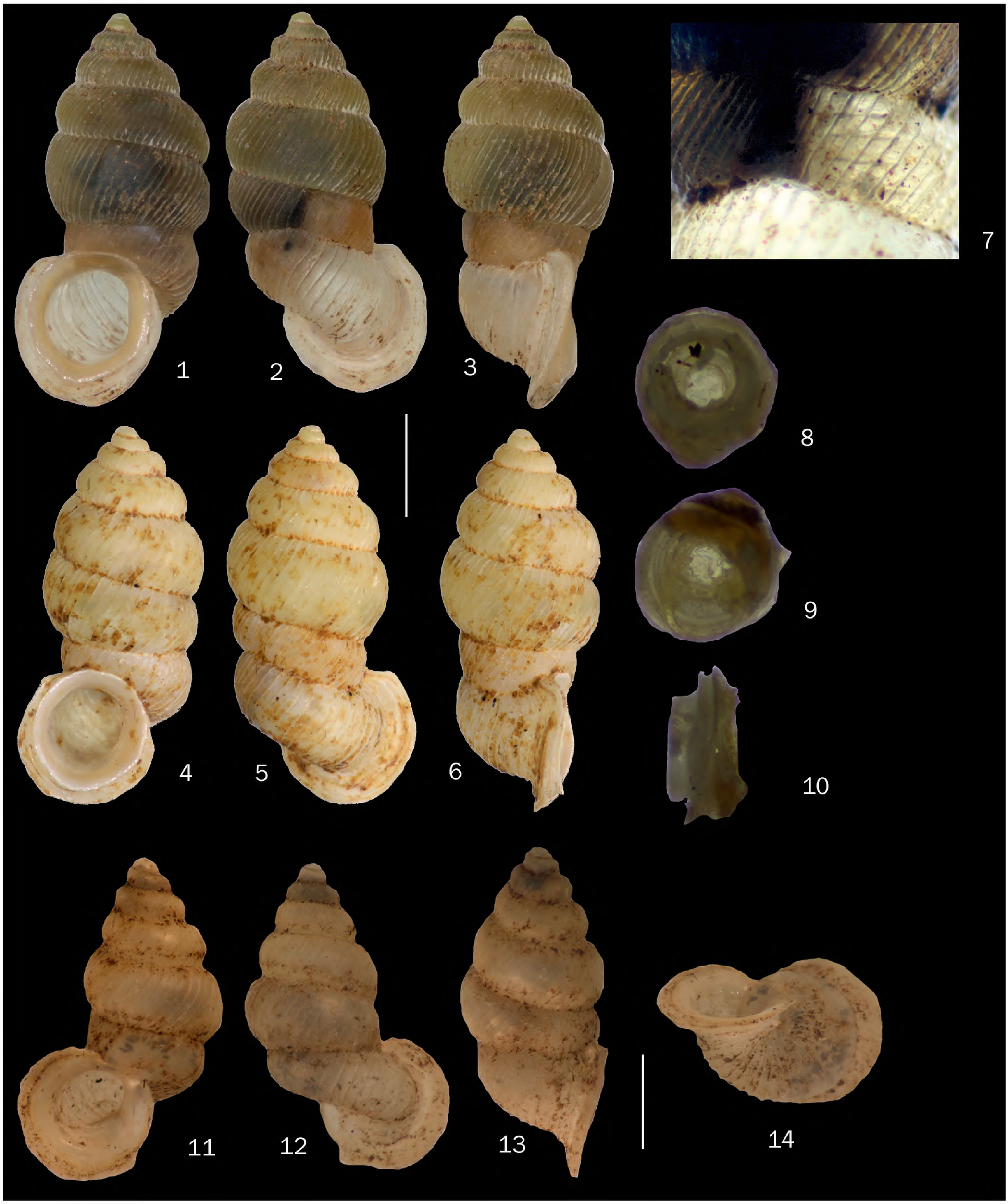
Figures 1-13. Miridae from Baiteta Forest with several taxa examined for comparison. Mirinae, Mirini and Stenodemini, dorsal view. 1 – *Tinginotopsis camelus* Poppius, 1915a, ♀ (FC n° 3899); 2 – *Tinginotum knowlesi* (Kirkaldy, 1908), ♂ (FC n° 3904); 3 – *Warrisia huonensis* (Poppius, 1914b), ♂ (FC n° 1083); 4 – *Lasiomiris neoguineanus* Carvalho, Afonso, 1977 (FC n° 4071); 5-7 – *Waucoris wauensis* Carvalho, 1987b: 5-6 – Paratypes ♀♀ (respectively FC n°s 4266 and 4265); 7 – ♀ from Baiteta Forest (FC n°3854); 8-9 – *Waucoris papuanus* (Poppius, 1915a): 8 – Holotype ♀; 9 – ♀ from Normanby Island (FC n°4261); 10 – *Waucoris longipes* (Poppius, 1915a), holotype ♂; 11-13 – *Waucoris keyensis* (Poppius, 1915a): 11 – ♂ from Bismarck Archipelago (ZMHF); 12 – Holotype ♀; 13 – ♀ from Bisinamu (FC n° 4262) [scale bars 1 mm].



Figures 1-13. Papuan Diplommatinidae. *Diancta* s. str. Martens, 1864. 1-10 – *Diancta* (s. str.) *constricta* (Martens, 1864): 1-4 – Lectotype in apertural, abapertural, lateral, and top view; 5-10 – Specimen from Tidore Island (8-10 – Operculum, outer surface (8), inner surface (9) and lateral view (10)); 11-13 – *D.* (s. str.) *multiplicata* von Möllendorff, 1902, holotype; photos: SMF [scale bars 1 mm].

Plate 20

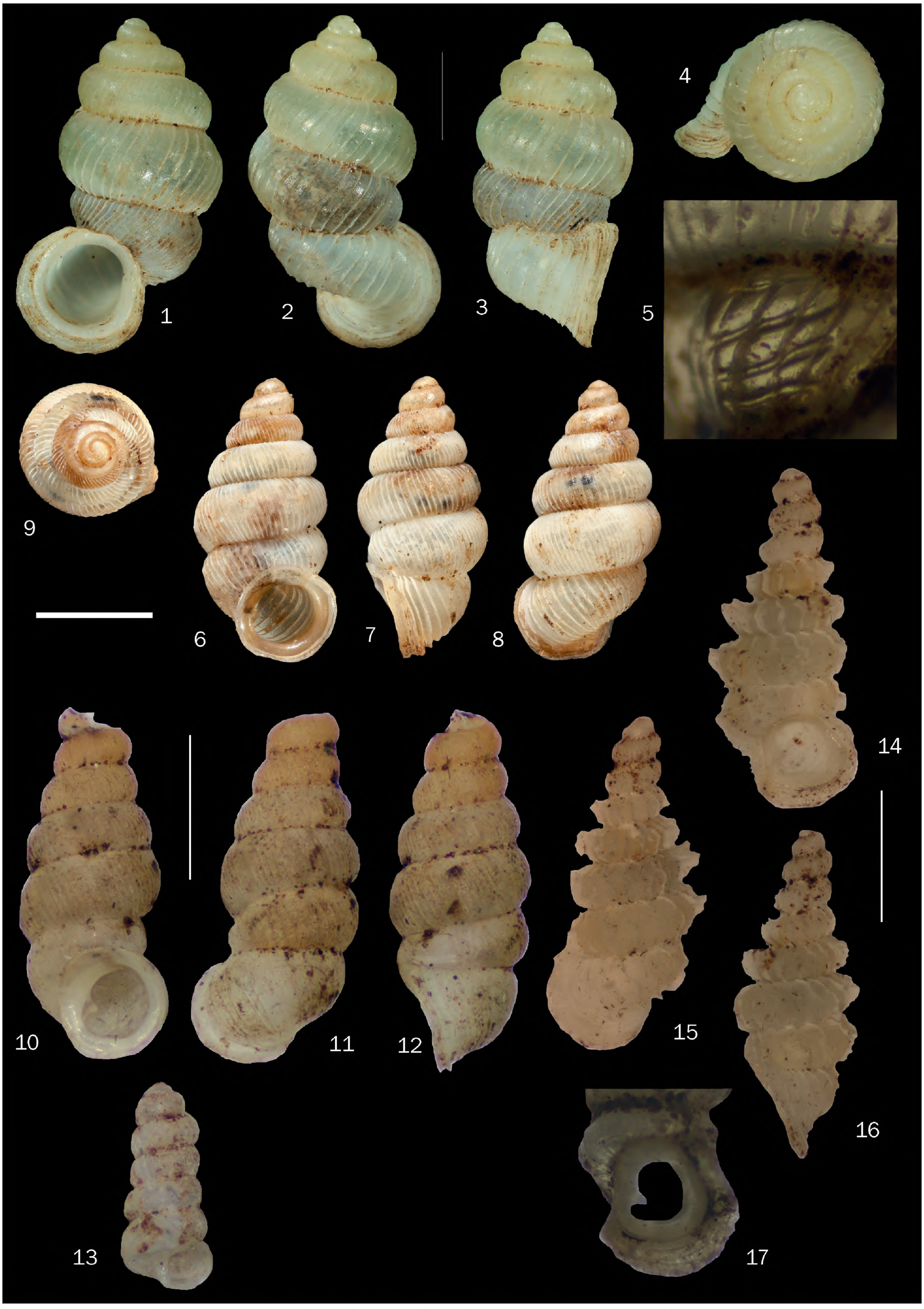
GREĶE, K.: Taxonomic review of Diplommatinidae (Caenogastropoda) from Wallacea and the Papuan Region



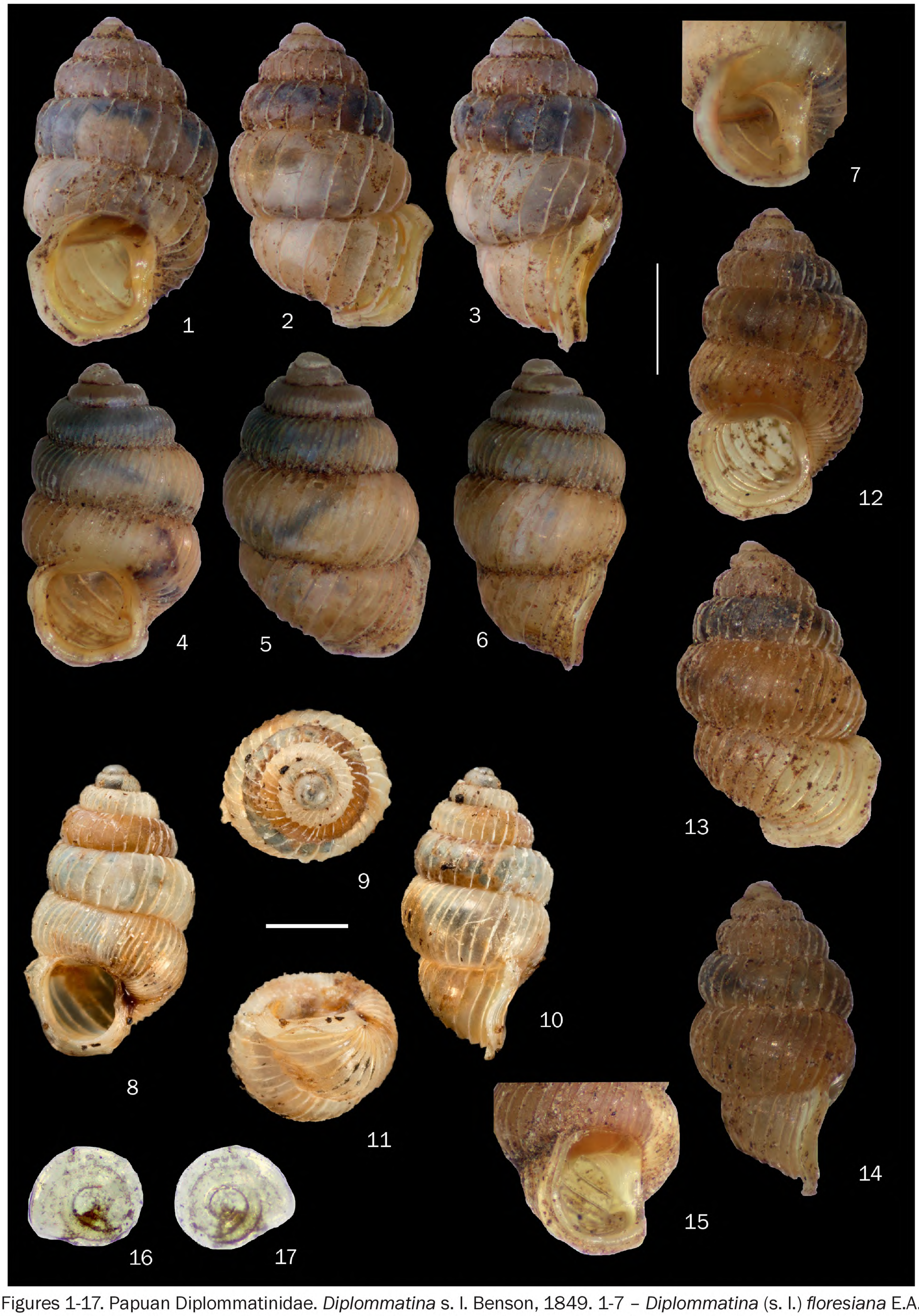
Figures 1-14. Papuan Diplommatinidae. *Diancta* s. str. Martens, 1864. 1-10 – *Diancta* (s. str.) *halmaherica* sp. nov.: 1-3 – Holotype in apertural, abapertural, and lateral view; 4-10 – Paratype from 10 km SW Tilope vill.: 7 – Four palatalis as seen through the shell wall); 8-10 – Operculum, outer surface (8), inner surface (9) and lateral view (10); 11-14 – *D.* (s. str.) *obiensis* sp. nov., holotype [scale bars 1 mm].

Plate 21

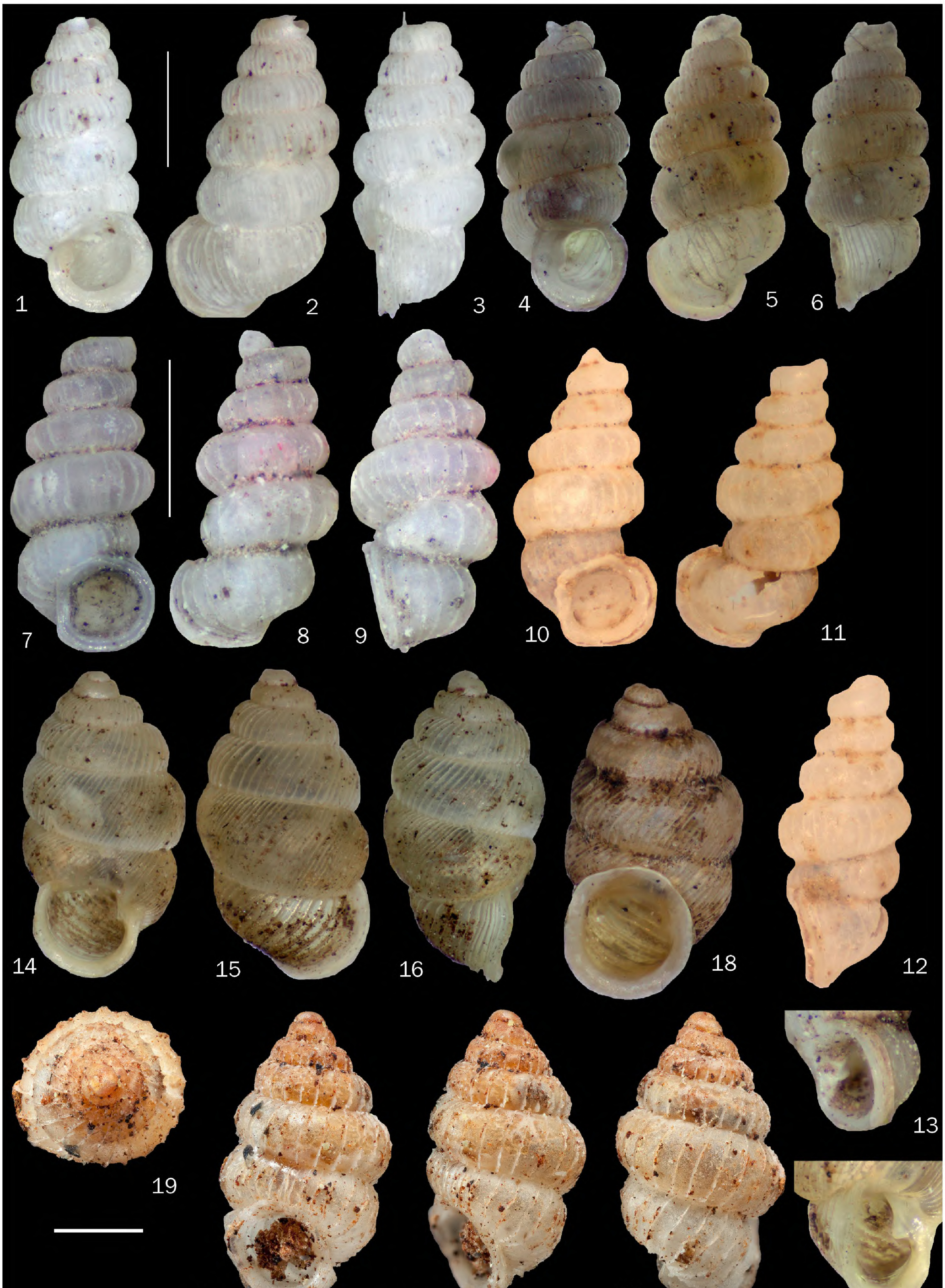
GREĶE, K.: Taxonomic review of Diplommatinidae (Caenogastropoda) from Wallacea and the Papuan Region



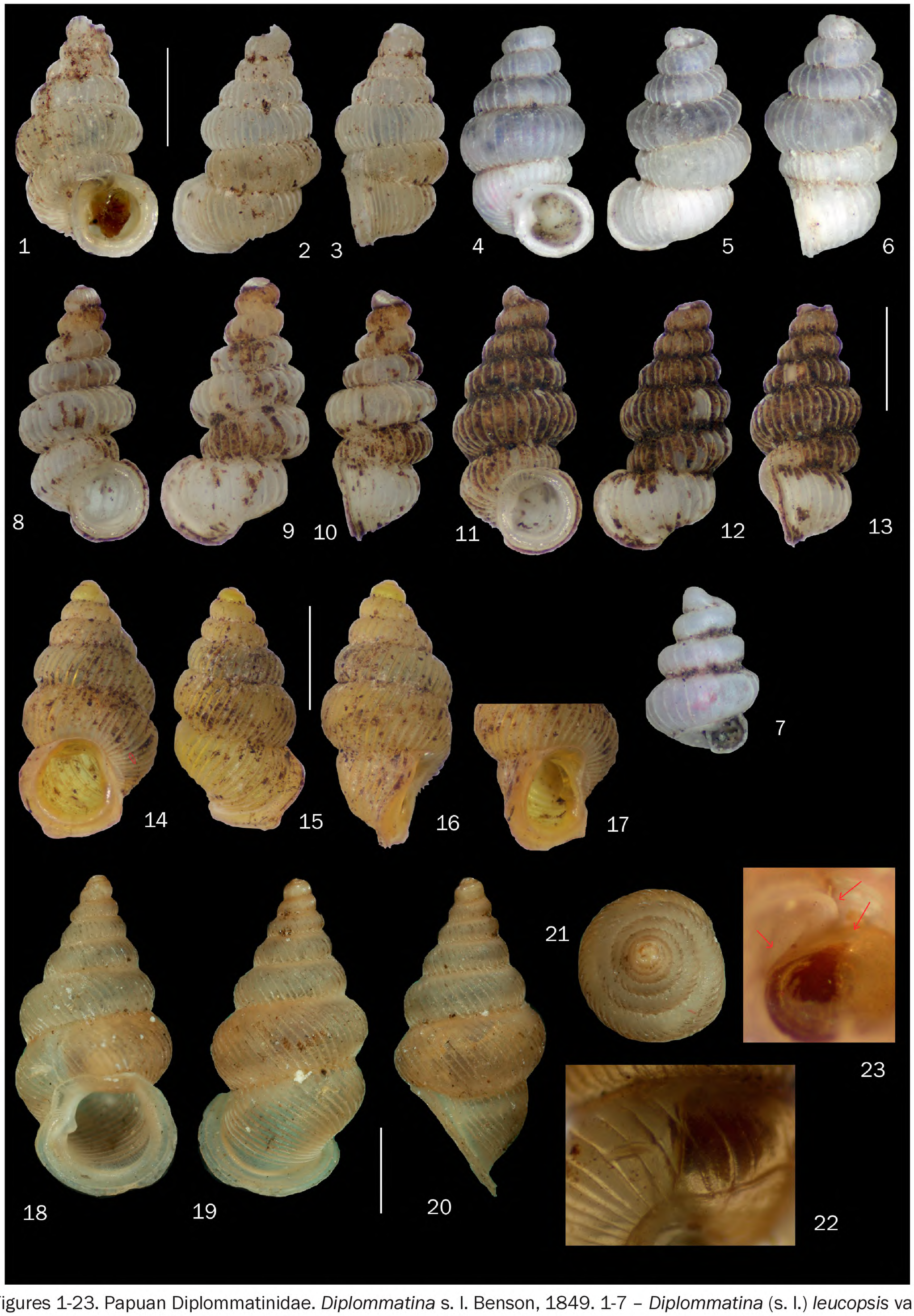
Figures 1-17. Papuan Diplommatinidae. *Diancta* s. str. Martens, 1864 & *Diplommatina* s. l. Benson, 1849. 1-5 – *Diancta* (s. str.) *torta* O. Boettger, 1891, holotype in apertural, abapertural, lateral and top view and four palatalis as seen through the shell wall; photos 1-4: SMF; 6-9 – Syntype *Diplommatina* (s. l.) *baliana* (Fulton, 1899), photos: BMNH; 10-13 – *D.* (s. l.) *decollata* van Benthem Jutting, 1958, holotype and juvenile paratype in apertural view (13); 14-17 – *D.* (s. l.) *slapcinskyi* sp. nov., holotype (14-16) and paratype's aperture (17) [scale bars 1 mm].



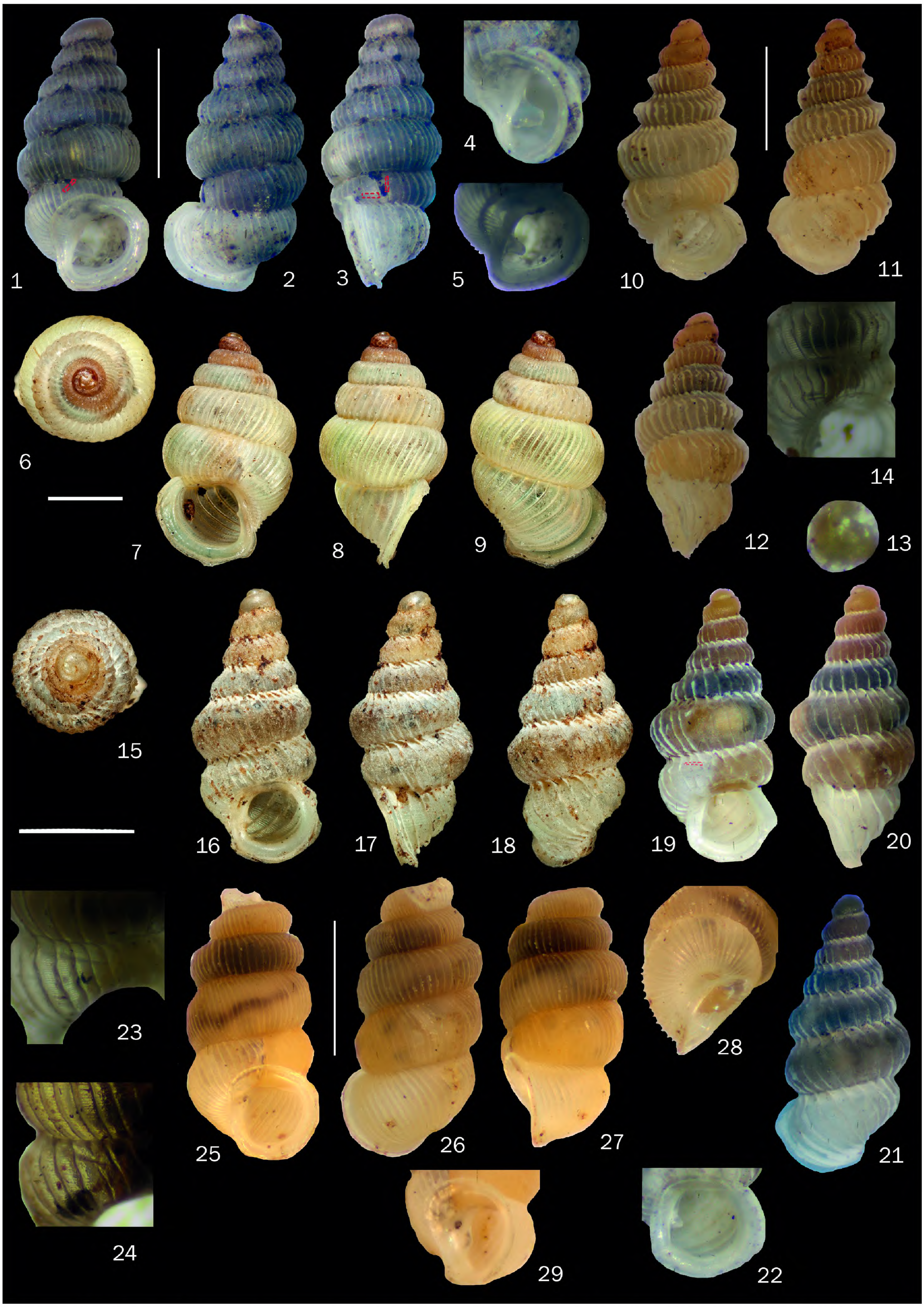
Figures 1-17. Papuan Diplommatinidae. *Diplommatina* s. l. Benson, 1849. 1-7 – *Diplommatina* (s. l.) *floresiana* E.A. Smith, 1897, specimen from Ranamese env. (Flores Island; 1-3) in apertural, abapertural, and lateral view and specimens from Mount Ranaka (Flores Island; 4-7); 8-17 – *D.* (s. l.) *jonabletti* sp. nov.: 8-11 – Syntype *D. floresiana*, photos: BMNH; 12-17 – Specimen from Mount Ranaka (Flores Island) (9 – Top view; 11 – Basal view); 16-17 – Operculum, outer (16) and inner surface (17) [scale bars 1 mm].



Figures 1-22. Papuan Diplommatinidae. *Diplommatina* s. l. Benson, 1849. 1-6 – *Diplommatina* (s. l.) *floris* B. Rensch, 1931, holotype (1-3) and paratype (4-6) in apertural, abapertural, lateral, and top view; 7-13 – *D.* (s. l.) *fluminis* B. Rensch, 1931, paratype (7-9) and specimens from Noilmina env. (Timor Island; 10-13); 14-18 – *D.* (s. l.) *javana* von Möllendorff, 1897, holotype *D. javana orientalis* B. Rensch, 1931 (14-17) and paratype (18) *D. javana orientalis*; 19-22 – *D.* (s. l.) *lombockensis* E.A. Smith, 1898, syntype; photos: BMNH [scale bars 1 mm].



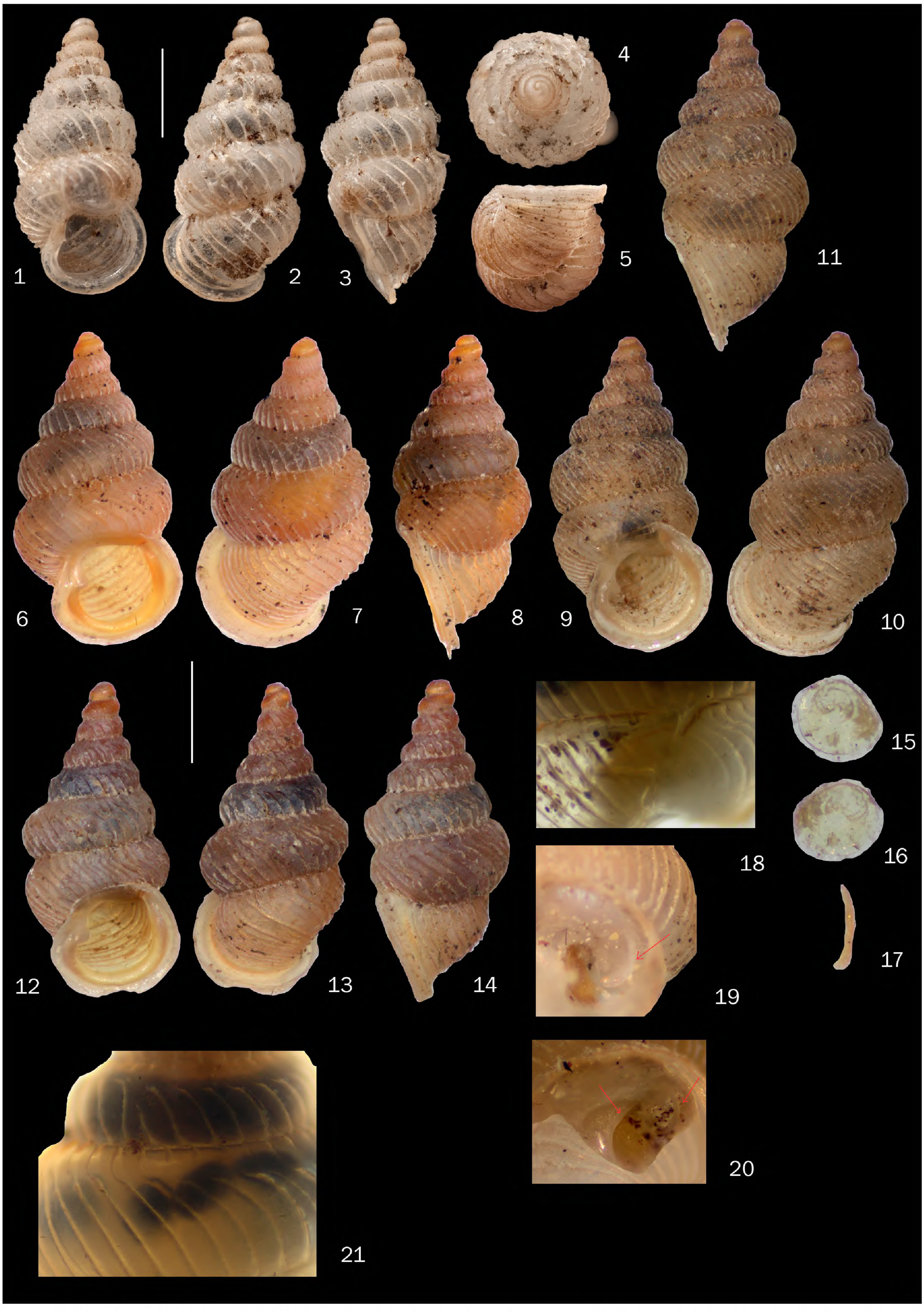
Figures 1-23. Papuan Diplommatinidae. *Diplommatina* s. l. Benson, 1849. 1-7 – *Diplommatina* (s. l.) *leucopsis* van Benthem Jutting, 1958, holotype (1-3), adult paratype (4-6) and juvenile paratype (7) in apertural, abapertural, and lateral view; 8-13 – *D.* (s. l.) *lucifuga* van Benthem Jutting, 1958, holotype (8-10) and paratype (11-13); 14-17 – *D.* (s. l.) *maibrat* sp. nov., holotype; 18-23 – *D.* (s. l.) *mertoni* C.R. Boettger, 1922, holotype (18-21; photos: SMF) and internal lamellae apparaturs of paratypes (22-23; consider red arrows pointing on parietalis and palatalis) [scale bars 1 mm].



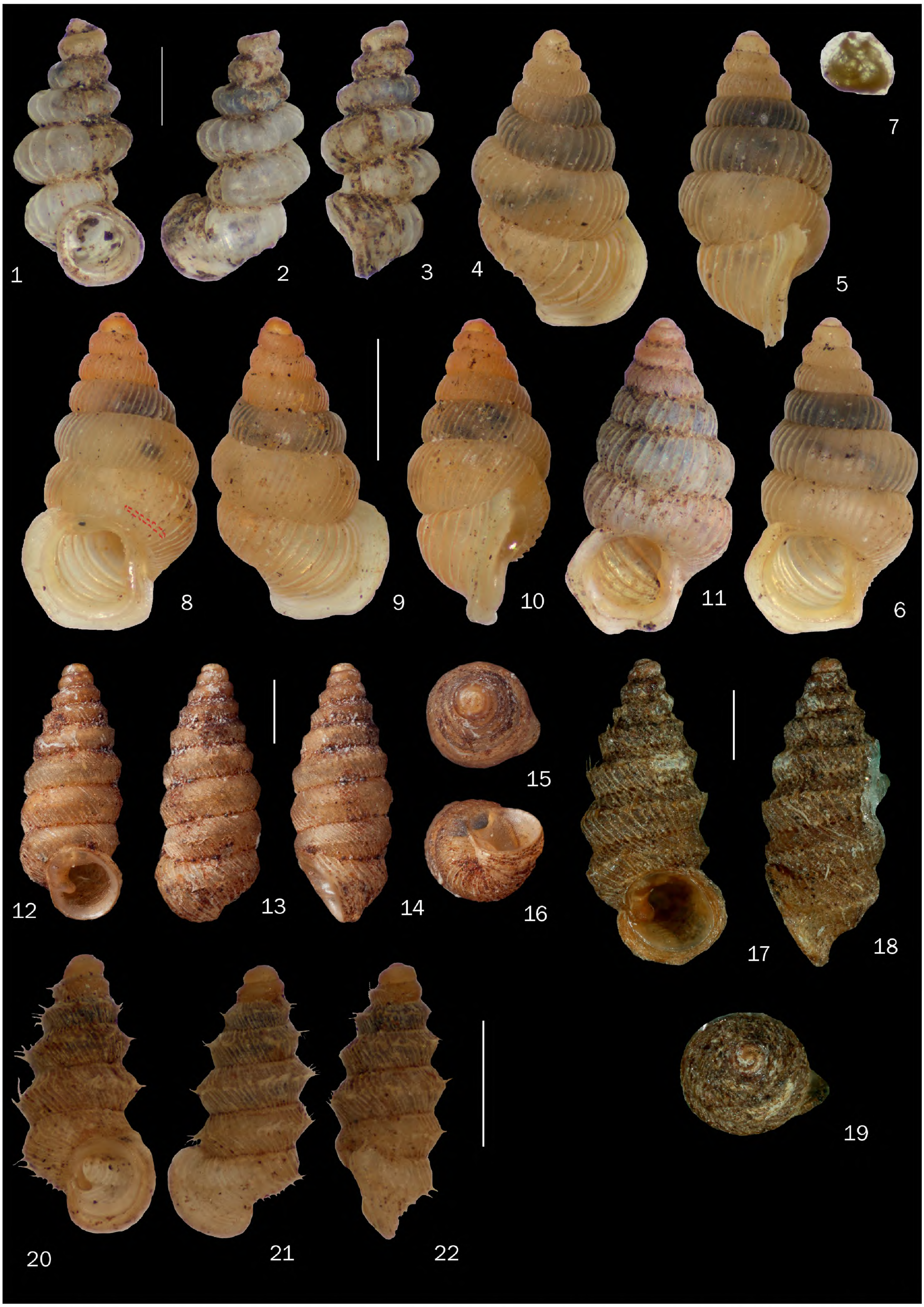
Figures 1-29. Papuan Diplommatinidae. *Diplommatina* s. l. Benson, 1849. 1-5 – *Diplommatina* (s. l.) *moluccensis* sp. nov., holotype (1-3) in apertural, abapertural, and lateral view (consider red dashes pointing on positions of internal lamellae) and aperture of a paratype (4-5); 6-9 – *D.* (s. l.) *smithi* Kobelt, von Möllendorff, 1898, syntype *D. papuana* E.A. Smith, 1897; photos: BMNH; 10-14 – *D.* (s. l.) *patani* sp. nov., paratype with internal lamellae apparatus as seen through the shell wall (13) and outer surface of operculum (14); 15-24 – *D.* (s. l.) *radiiformis* Preston, 1913, syntype (15-18; photos: BMNH) and specimens from Galela, NE Halmahera (19-24); 25-29 – *D.* (s. l.) *timorensis* sp. nov., holotype (28 – Basal view) [scale bars 1 mm].

Plate 26

GREĶE, K.: Taxonomic review of Diplommatinidae (Caenogastropoda) from Wallacea and the Papuan Region



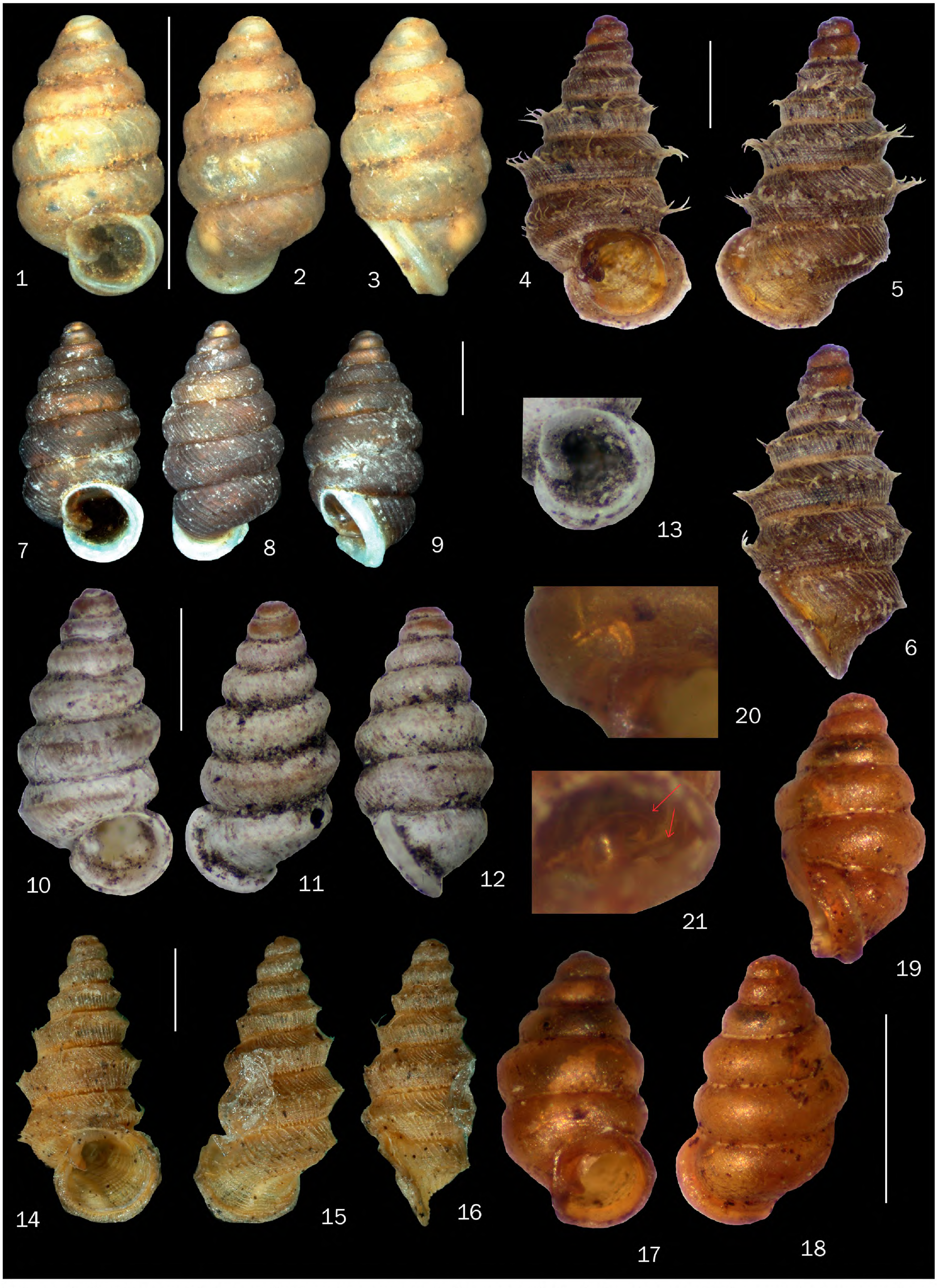
Figures 1-21. Papuan Diplommatinidae. *Diplommatina* s. l. Benson, 1849. 1-5 – *Diplommatina* (s. l.) *symmetrica* Hedley, 1891, lectotype (1-4) and paralectotype (5) in apertural, abapertural, lateral, top, and basal view; photos: BMNH; 6-21 – *D.* (s. l.) *telnovi* sp. nov.: 6-8 – Specimen from Uter lakeside, Doberai Peninsula (New Guinea); 9-11 & 18-19 – Specimen from Misool Island; 12-14 – Specimen from River Sakarteman valley, Onin Peninsula (New Guinea); 15-17 – Operculum, outer (15), inner surface (16), and lateral view (17); 18-20 – Internal lamellae apparaturs of a paratype as seen through the shell wall (18), consider red arrows pointing on parietalis and palatalis (19-20); 21 – Structure of teleoconch axial ribs [scale bars 1 mm].



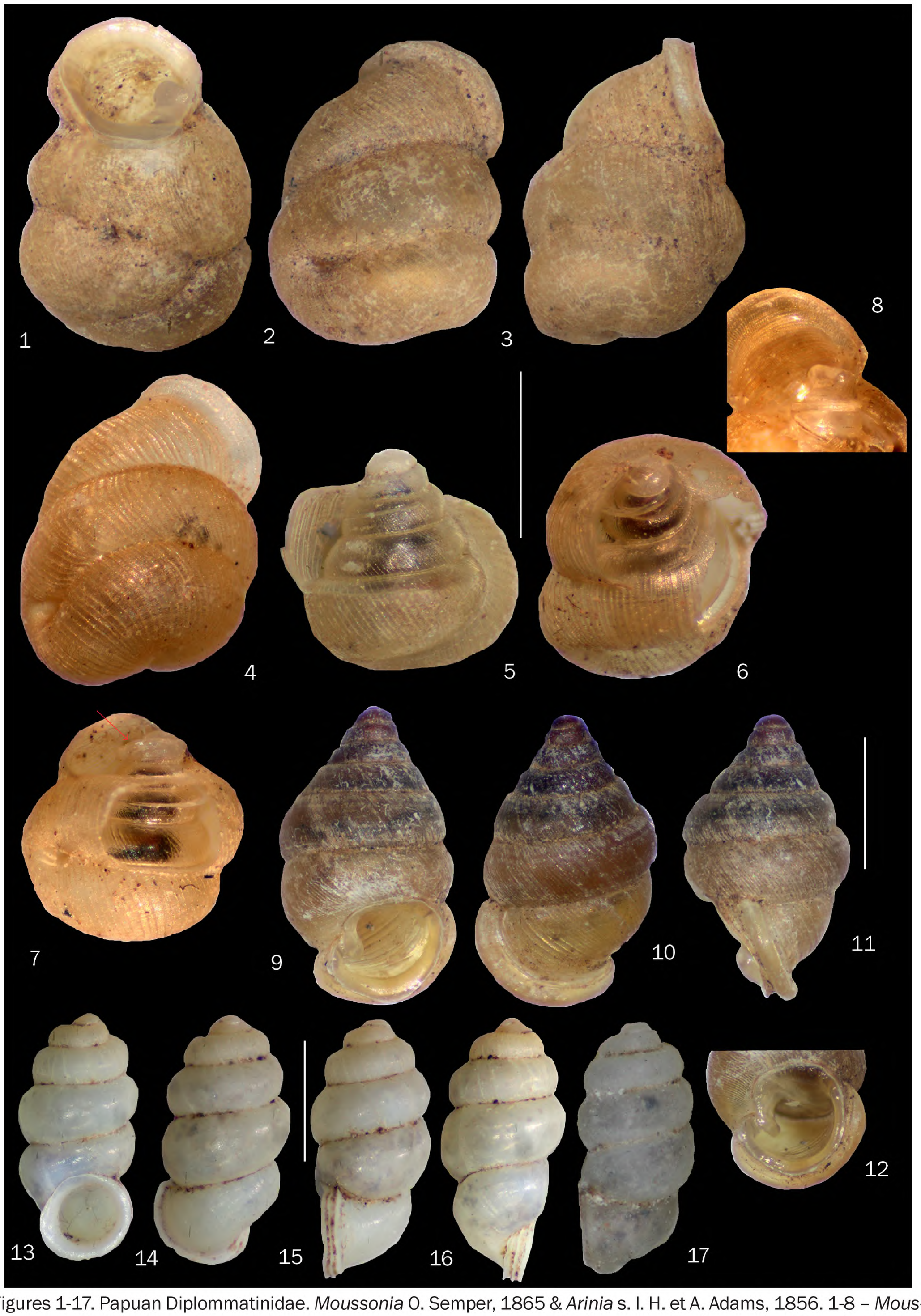
Figures 1-22. Papuan Diplommatinidae. *Diplommatina* s. l. Benson, 1849 & *Moussonia* O. Semper, 1865. 1-3 – *Diplommatina* (s. l.) *torquilla* van Benthem Jutting, 1958, holotype in apertural, abapertural, and lateral view; 4-11 – *D.* (s. l.) *waigeoensis* sp. nov., paratypes (consider red dashes pointing on position of internal lamella on Fig. 8); 7 – Operculum, outer surface; 12-16 – *Moussonia ahena* (Preston, 1913). lectotype (15 – Top view; 16 – Basal view); photos: BMNH; 17-19 – *M. hirsuta* (Zilch, 1953), holotype; photos: SMF; 20-22 – *M.* (s. l.) *echinata* sp. nov., holotype [scale bars 1 mm].

Plate 28

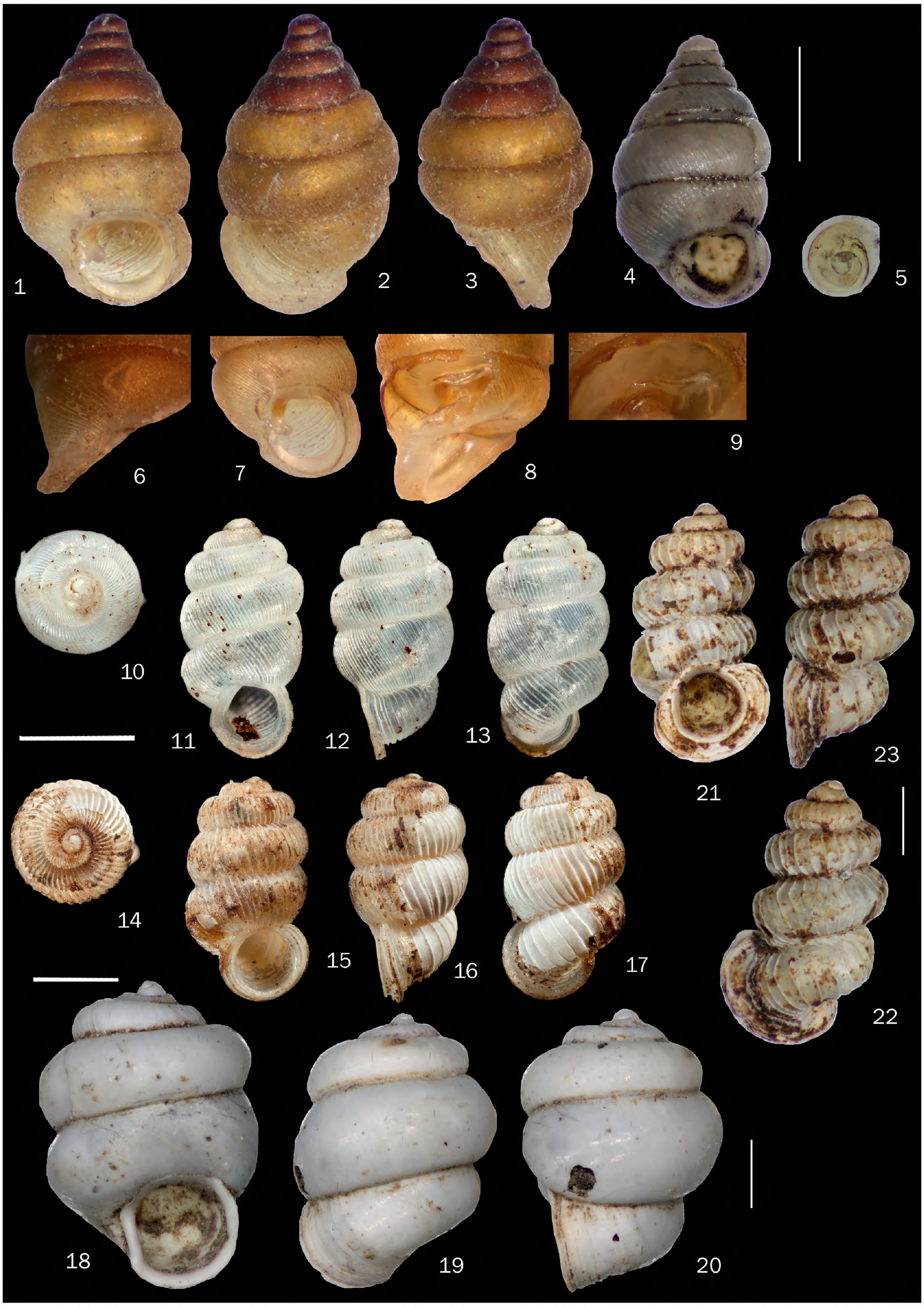
GREĶE, K.: Taxonomic review of Diplommatinidae (Caenogastropoda) from Wallacea and the Papuan Region



Figures 1-21. Papuan Diplommatinidae. *Moussonia* O. Semper, 1865. 1-3 – *Moussonia hyponepia* (van Benthem Jutting, 1958), holotype in apertural, abapertural, and lateral view; photos: NMNL; 4-6 – *M. manuselae* sp. nov., holotype; 7-9 – *M. omias* (van Benthem Jutting, 1958), paratype; photos: NMNL; 10-13 – *M. papuana* (Tapparone Canefri, 1883), paralectotypes; 14-16 – *M. strubelli* (O. Boettger, 1891), holotype; photos: SMF; 17-21 – *M. torricelli* sp. nov., holotype: 20 – Internal lamellae apparatus as seen through the shell wall; 21 – Paratype, position of two parietalis (consider red arrows) [scale bars 1 mm].



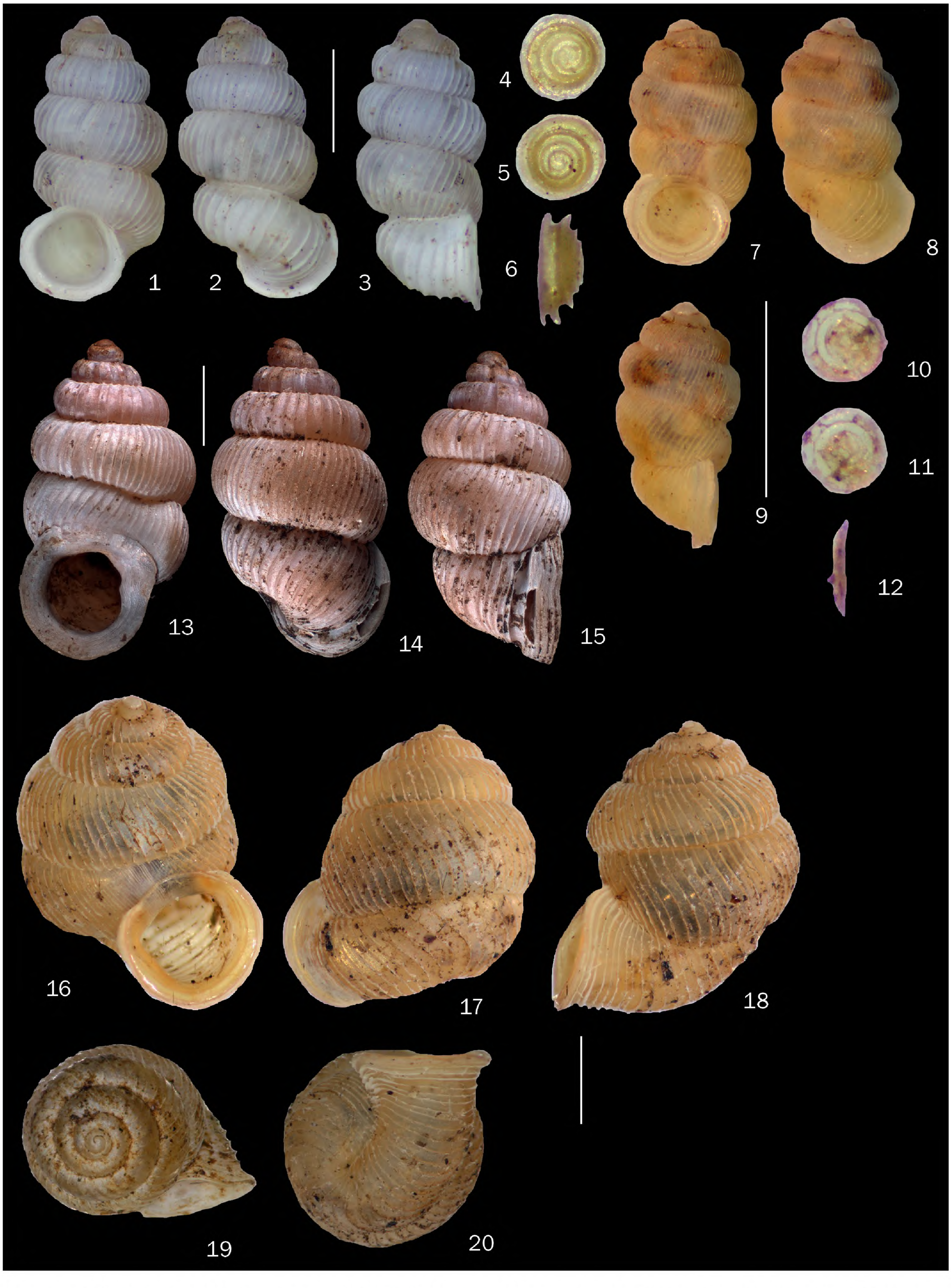
Figures 1-17. Papuan Diplommatinidae. *Moussonia* O. Semper, 1865 & *Arinia* s. l. H. et A. Adams, 1856. 1-8 – *Moussonia monstrificabilis* sp. nov., paratypes in apertural, abapertural, and lateral view (1-4), aperture (8) and subadult specimens (5-7); 9-12 – *M. pseudoseparanda* sp. nov., holotype; 13-17 – *Arinia (s. l.) tjendanae* B. Rensch, 1931, paratype (13-16) and holotype (17) [scale bars 1 mm].



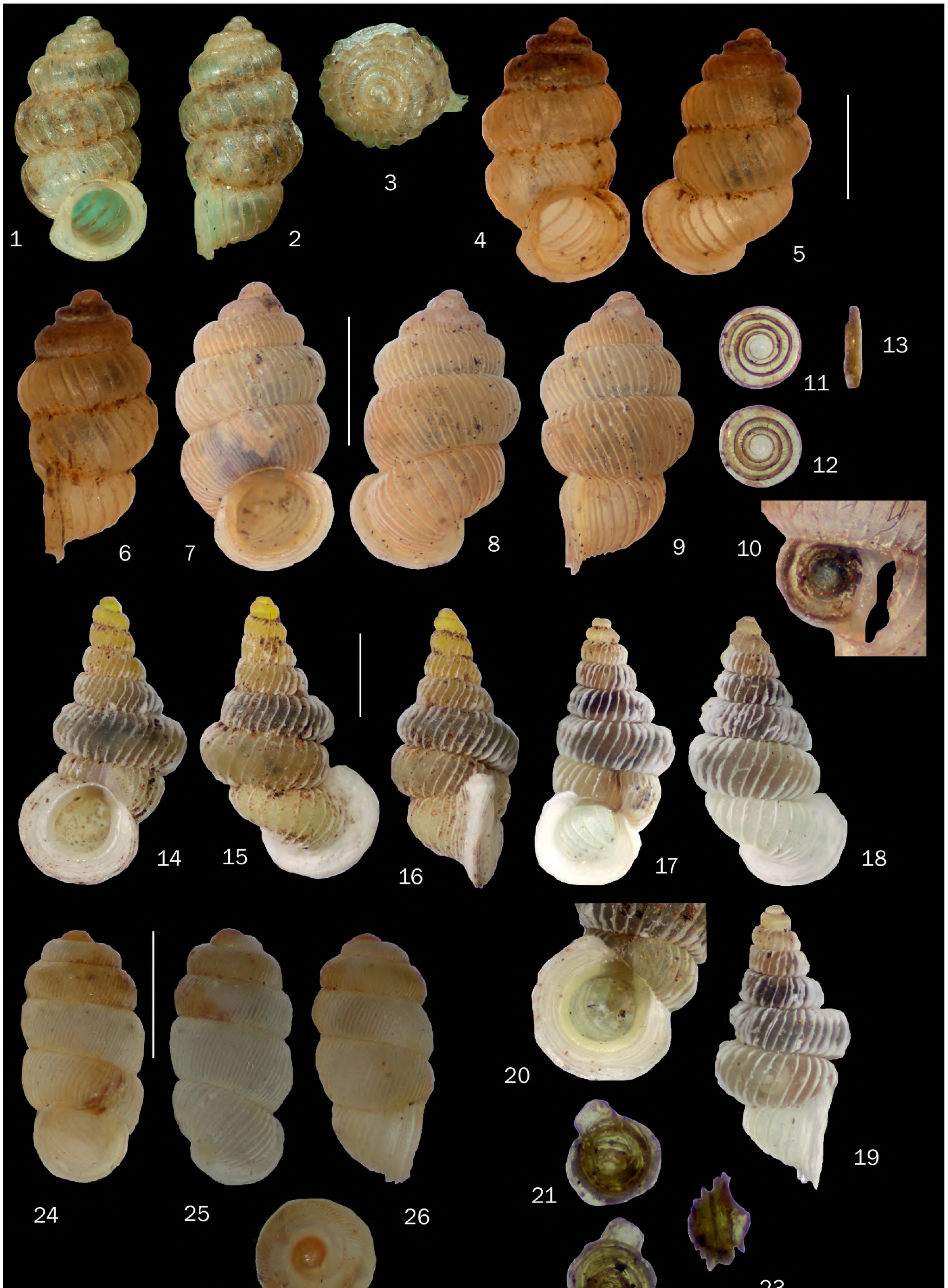
Figures 1-23. Papuan Diplommatinidae. *Moussonia* O. Semper, 1865 & *Arinia* s. l. H. et A. Adams, 1856. 1-9 – *Moussonia separanda* sp. nov., paratypes in apertural, abapertural, and lateral view: 1-3 & 5-9 – Specimen from locus typicus: 5 – Operculum, outer surface; 6-7 – Internal lamellae apparatus as seen through the shell wall; 8-9 – Internal lamellae apparatus; 4 – Specimen from Yan Island S of Misool; 10-13 – *Arinia* (s. l.) *blanda* E.A. Smith, 1897, syntype; photos: BMNH; 14-17 – *A.* (s. l.) *talautana* Fulton, 1898, syntype; photos: BMNH; 18-20 – *A.* (s. l.) *crassiventris* B. Rensch, 1931, holotype; 21-23 – *A.* (s. l.) *patagiata* van Benthem Jutting, 1958 [scale bars 1 mm].

Plate 31

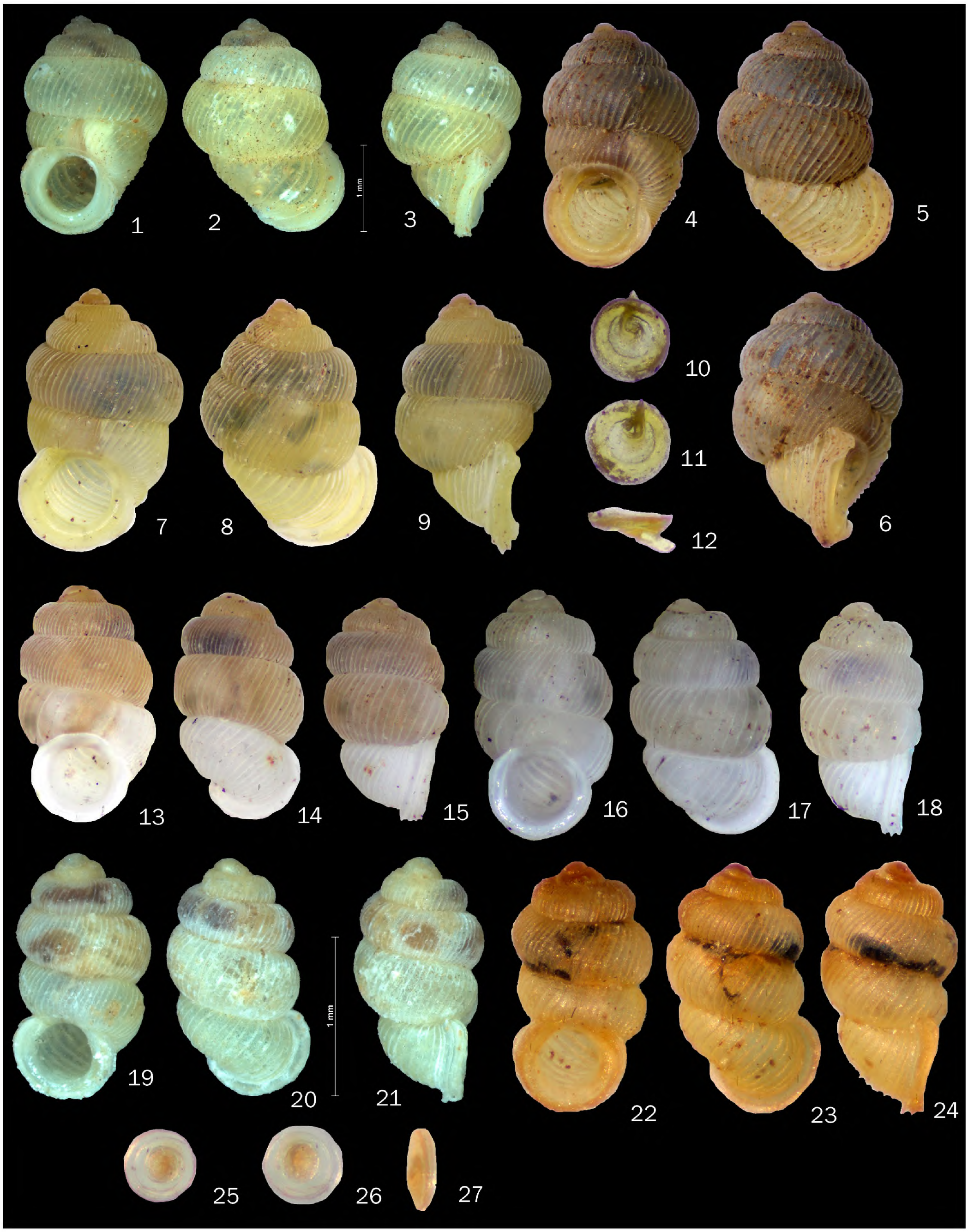
GREĶE, K.: Taxonomic review of Diplommatinidae (Caenogastropoda) from Wallacea and the Papuan Region



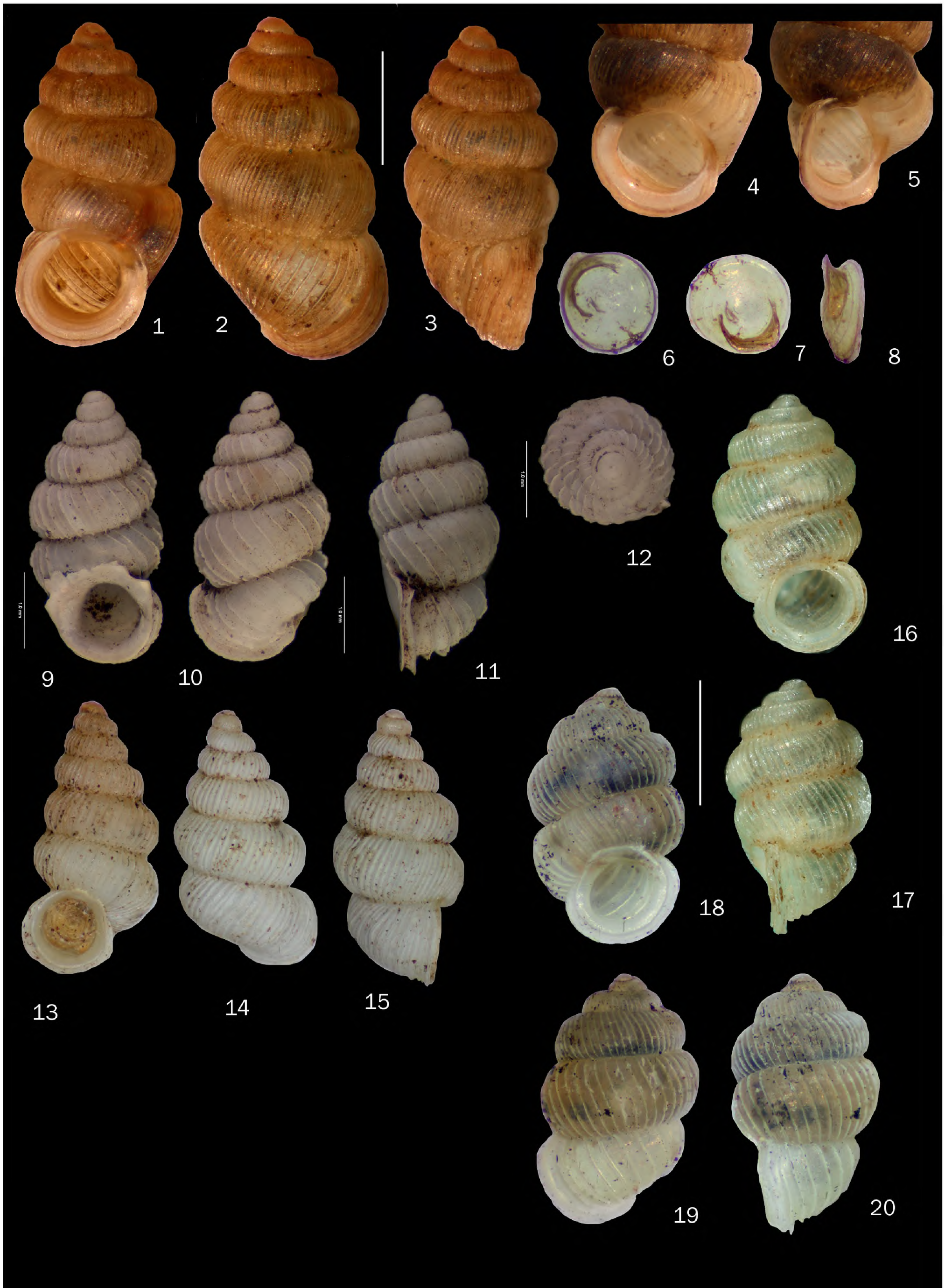
Figures 1-20. Papuan Diplommatinidae. *Palaina* O. Semper, 1865. 1-6 – *Palaina* (s. l.) *adelpha* Soós, 1911, paratype in apertural, abapertural, and lateral view and operculum, outer (4), inner surface (5), and lateral view (6); 7-12 – *P.* (s. l.) *albrechti* sp. nov., paratype; 13-15 – *P.* (s. l.) *aerari* (Dell, 1955), holotype (also consider Plate 40 figs 14-16); photos: MONZ; 16-20 – *P.* (s. l.) *ascendens* (Martens, 1864), specimen from Saparua Island (19 – top view, 20 – basal view) [scale bars 1 mm].



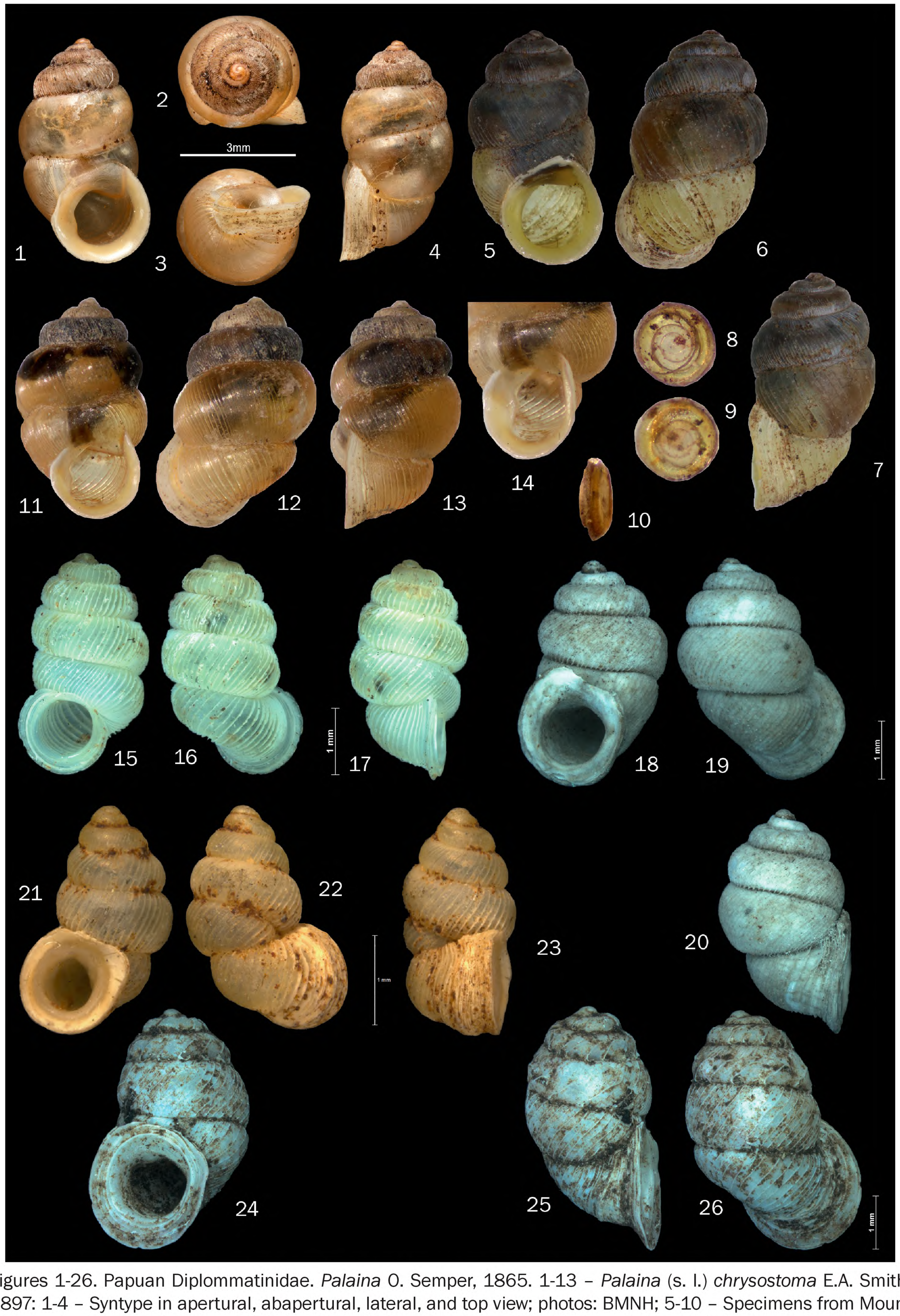
Figures 1-27. Papuan Diplommatinidae. *Palaina* O. Semper, 1865. 1-13 – *Palaina* (s. l.) *angulata* O. Boettger, 1891: 1-3 – Lectotype in apertural, abapertural, and lateral view; photos: SMF; 4-6 – Paralectotype; 7-9 & 10 – Specimen from Saparua Island (10 – Columellar plate and position of operculum); 11-13 – Specimen from Soya vill. env. (Ambon Island), operculum, outer (11), inner surface (12), and lateral view (13); 14-23 – *P.* (s. l.) *attenboroughi* sp. nov., paratypes; 24-27 – *P.* (s. l.) *beilanensis* Preston, 1913, lectotype (27 – top view) [scale bars 1 mm].



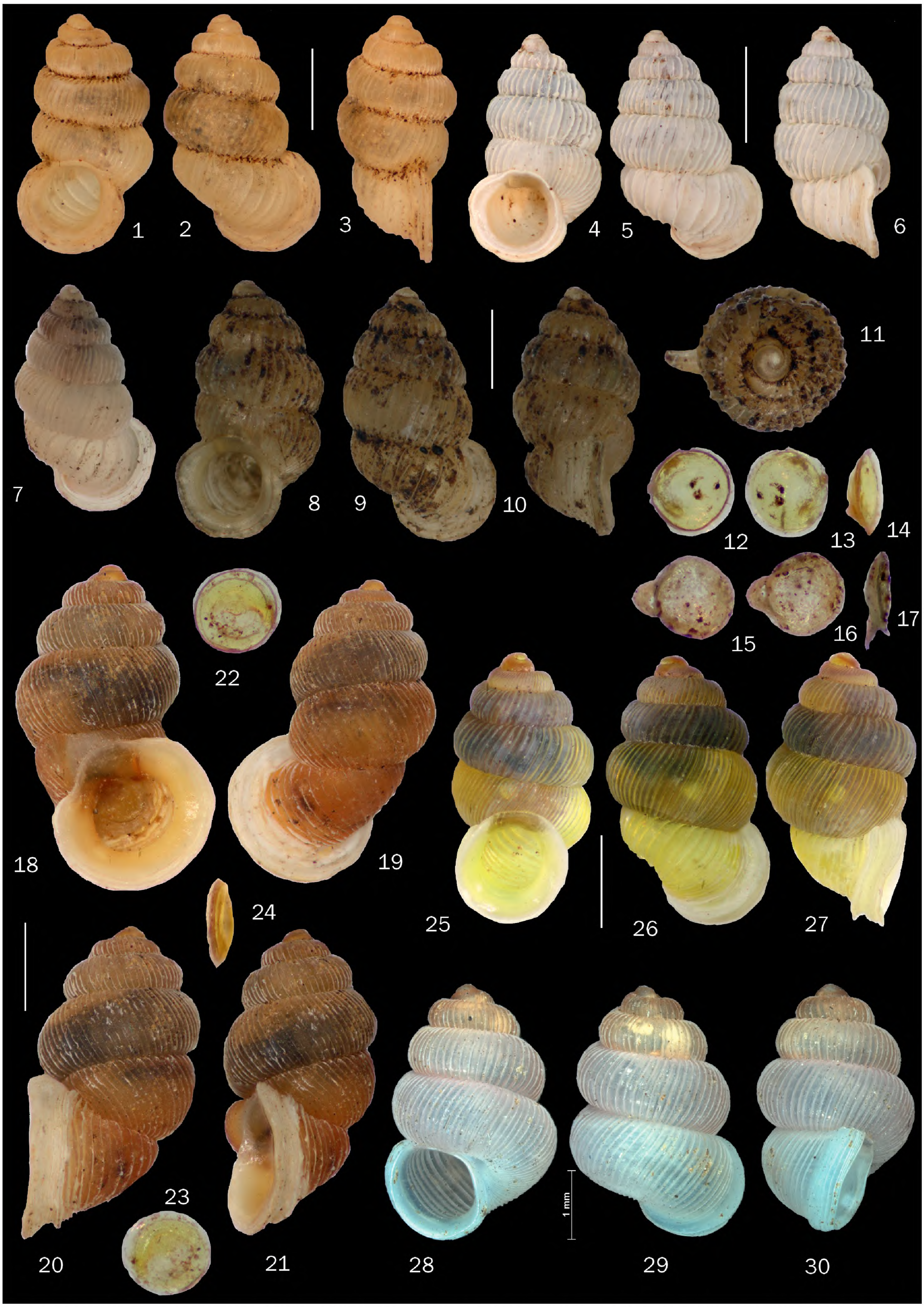
Figures 1-27. Papuan Diplommatinidae. *Palaina* O. Semper, 1865. 1-12 – *Palaina* (s. l.) *bicornis* van Benthem Jutting, 1958: 1-3 – Paratype in apertural, abapertural, and lateral view; photos: NMNL; 4-12 – Specimens from River Gam valley (Central Misool); 10-12 – Operculum, outer (10), inner surface (11,) and lateral view (12); 13-27 – *P.* (s. l.) *biroi* Soós, 1911: 13-18 & 22-27 – Specimens from various localities in Madang Province (Papua New Guinea); 19-21 – Lectotype; photos: NMNL [scale bars 1 mm].



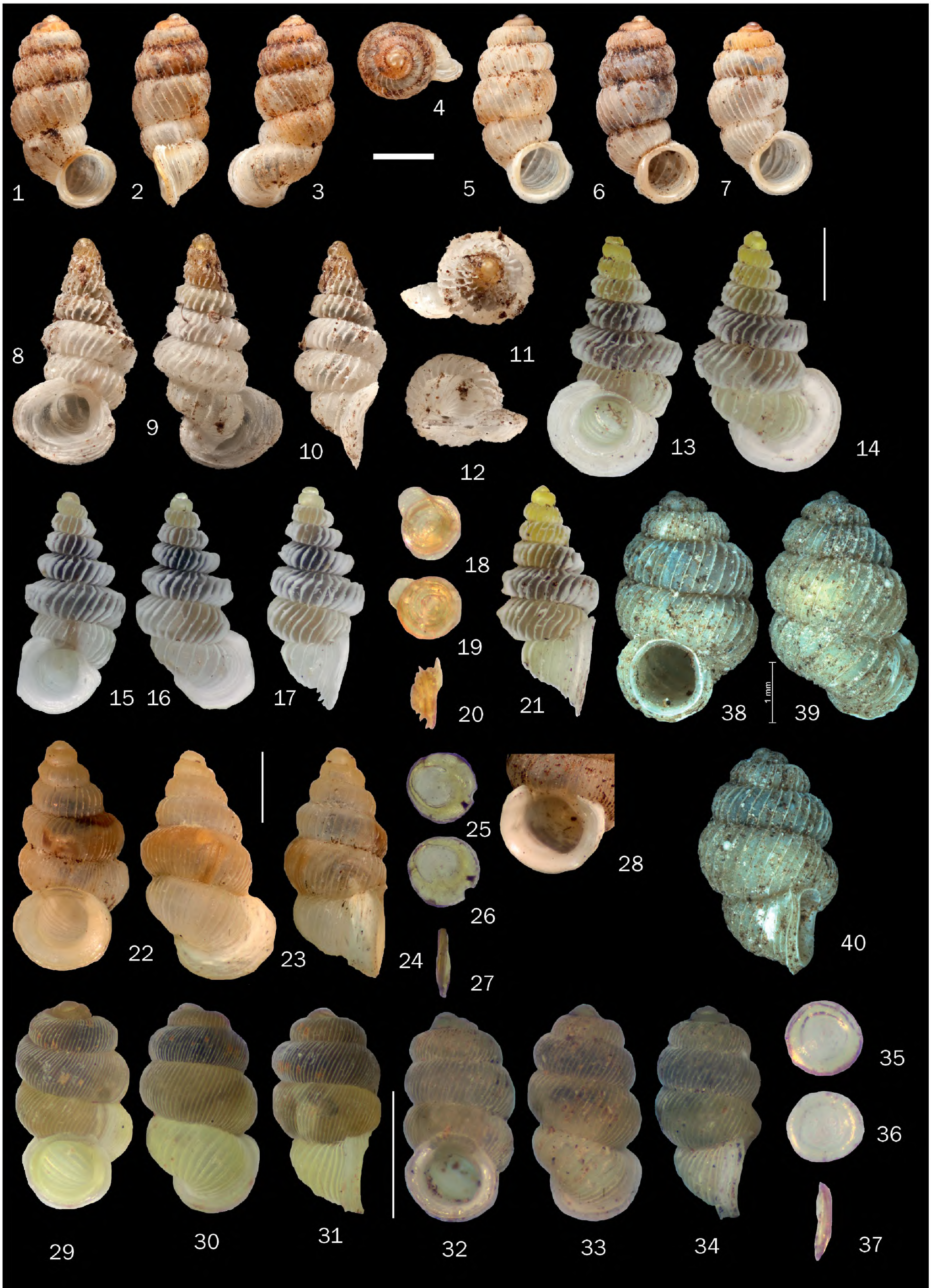
Figures 1-20. Papuan Diplommatinidae. *Palaina* O. Semper, 1865. 1-8 – *Palaina* (s. l.) *bougainvillei* sp. nov.: 1-3 – Holotype in apertural, abapertural, and lateral view; 4-8 – Paratype; 6-8 – Operculum, outer (6), inner surface (7), and lateral view (8); 9-12 – *P.* (s. l.) *brazieri* (Cox, 1870), specimen from Kira Kira (Makira Island, Solomon Islands) (12 – top view); photos: MCZ; 13-15 – *P.* (s. l.) *bundiana* Wiktor, 1998: 13 – Holotype; 14-15 – Paratype; 16-20 – *P.* (s. l.) *carbavica* O. Boettger, 1891: 16-17 – Lectotype; photos: SMF; 18-20 – Specimen from Horale vill. env., Manusela Ridge (Seram Island) [scale bars 1 mm].



Figures 1-26. Papuan Diplommatinidae. *Palaina* O. Semper, 1865. 1-13 – *Palaina* (s. l.) *chrysostoma* E.A. Smith, 1897: 1-4 – Syntype in apertural, abapertural, lateral, and top view; photos: BMNH; 5-10 – Specimens from Mount Ranaka (Flores Island) with operculum, outer (8), inner surface (9) and in lateral view (10); 11-14 – Specimen from Tebedo env. (Flores Island); 15-17 – *P.* (s. l.) *citrinella* van Benthem Jutting, 1963, holotype; photos: NMNL; 18-20 – *P.* (s. l.) *consobrina* van Benthem Jutting, 1963, holotype; photos: NMNL; 21-23 – *P.* (s. l.) *clappi* Solem, 1960, holotype; photos: UMMZ; 24-26 – *P.* (s. l.) *cupulifera* van Benthem Jutting, 1963, holotype; photos: NMNL [scale bars 1 mm, figs 1-4 scale bar 3 mm].



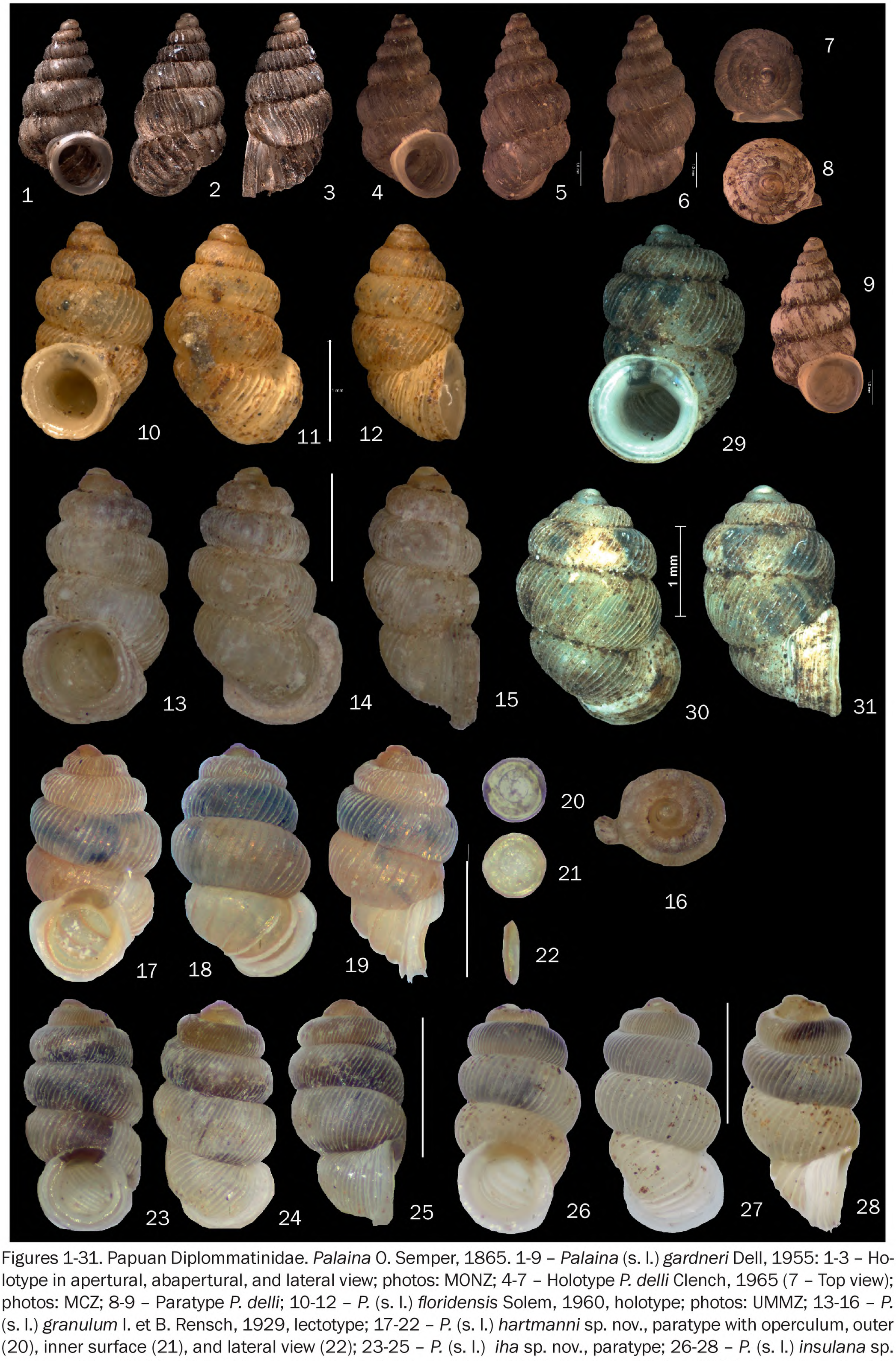
Figures 1-30. Papuan Diplommatinidae. *Palaina* O. Semper, 1865. 1-17 – *Palaina* (s. l.) *commixta* I. Rensch, 1937: 1-3 – Holotype in apertural, abapertural, and lateral view; 4-7 & 12-17 – Specimens from Galowe vill. env. (New Britain); 12-17 – Operculi, outer (12 & 15), inner surface (13 & 16), and lateral view (14 & 17); 8-11 – Holotype *P. commixta jacquinoti* I. Rensch, 1937 (11 – Top view); 18-24 – *P.* (s. l.) *dianctoides* sp. nov., holotype (consider strong bulb particularly visible on Fig. 21); 25-27 – *P.* (s. l.) *doberai* sp. nov., holotype; 28-30 – *P.* (s. l.) *erythropeplos* van Benthem Jutting, 1958, holotype; photos: NMNL [scale bars 1 mm].



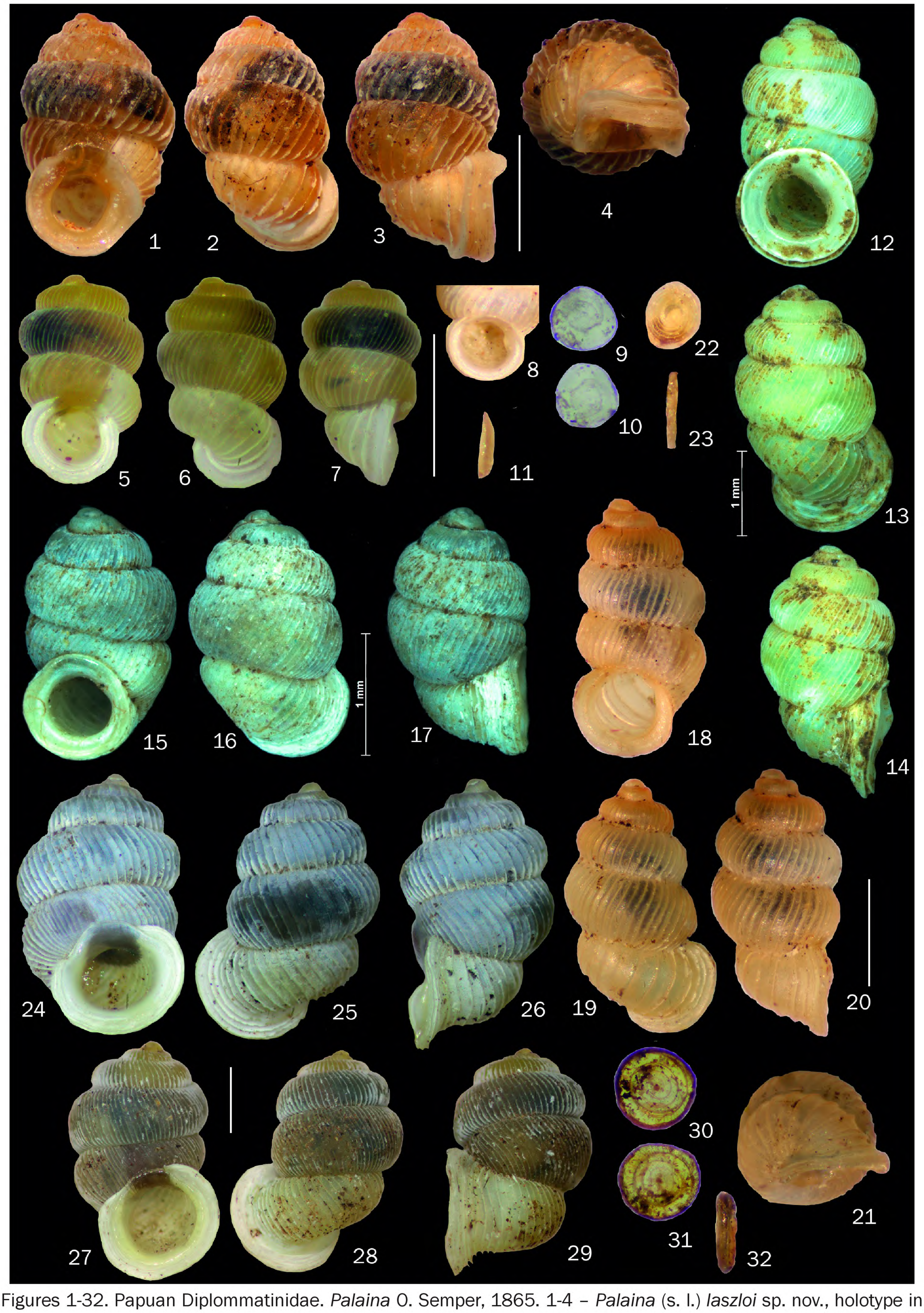
Figures 1-40. Papuan Diplommatinidae. *Palaina* O. Semper, 1865. 1-7 – *Palaina* (s. l.) *diepenheimi* (Preston, 191): 1-4 – Lectotype in apertural, abapertural, lateral, and top view; 5-7 – Paralectotypes; photos: BMNH; 8-21 – *P.* (s. l.) *dohertyi* E.A. Smith, 1897: 8-12 – Lectotype (12 – Basal view); photos: BMNH; 13-21 – Specimens from River Sakarteman valley (Onin Peninsula, Indonesian New Guinea), with operculum, outer (18), inner surface (19), and lateral view (20); 22-28 – *P.* (s. l.) *extremita* sp. nov., holotype; 29-37 – *P.* (s. l.) *flavocylindrica* sp. nov., paratypes from Lake Kamakawalar env. (Indonesian New Guinea); 38-40 – *P.* (s. l.) *glabella* van Benthem Jutting, 1963, holotype; photos: NMNL [scale bars 1 mm].

Plate 38

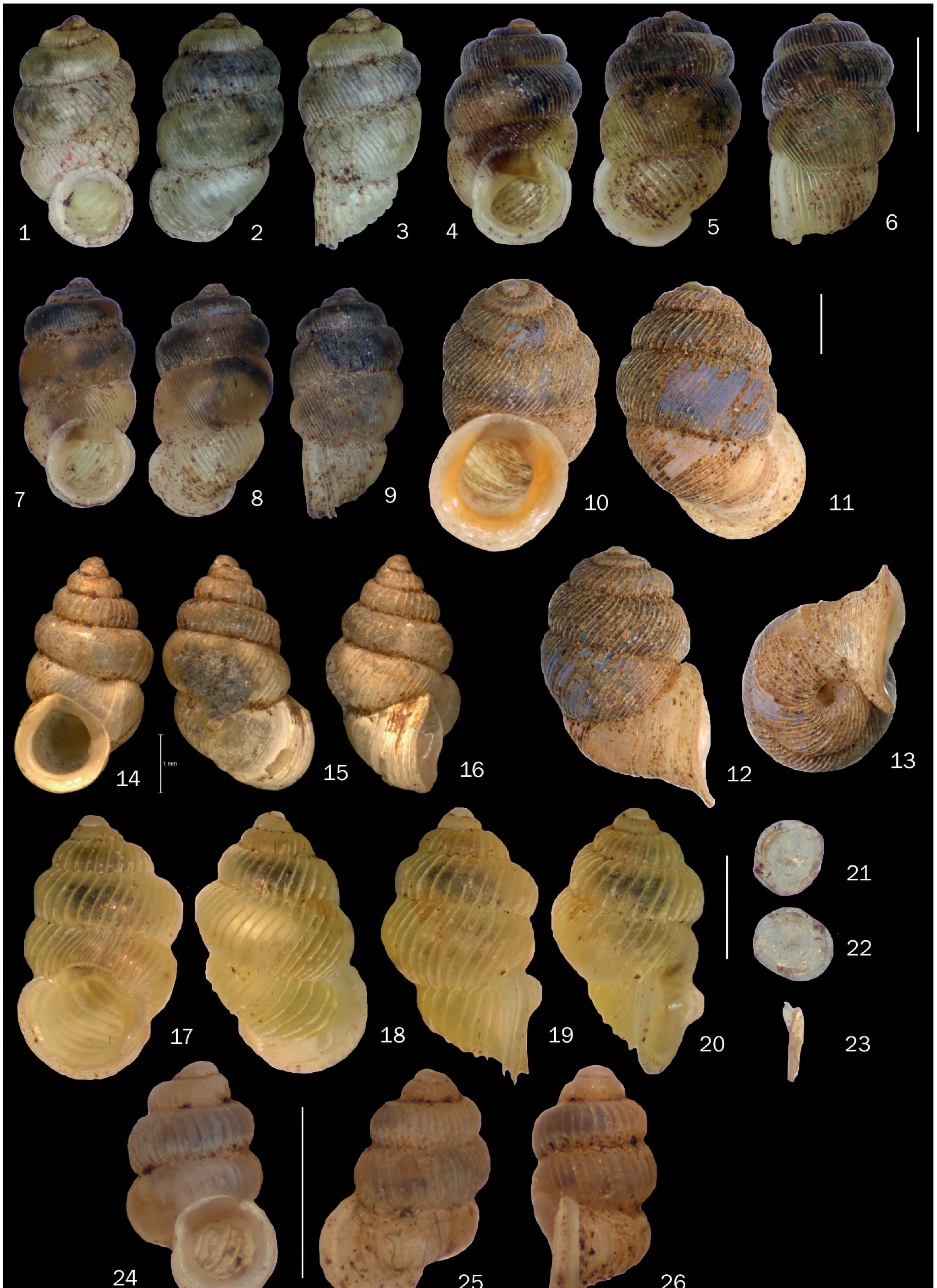
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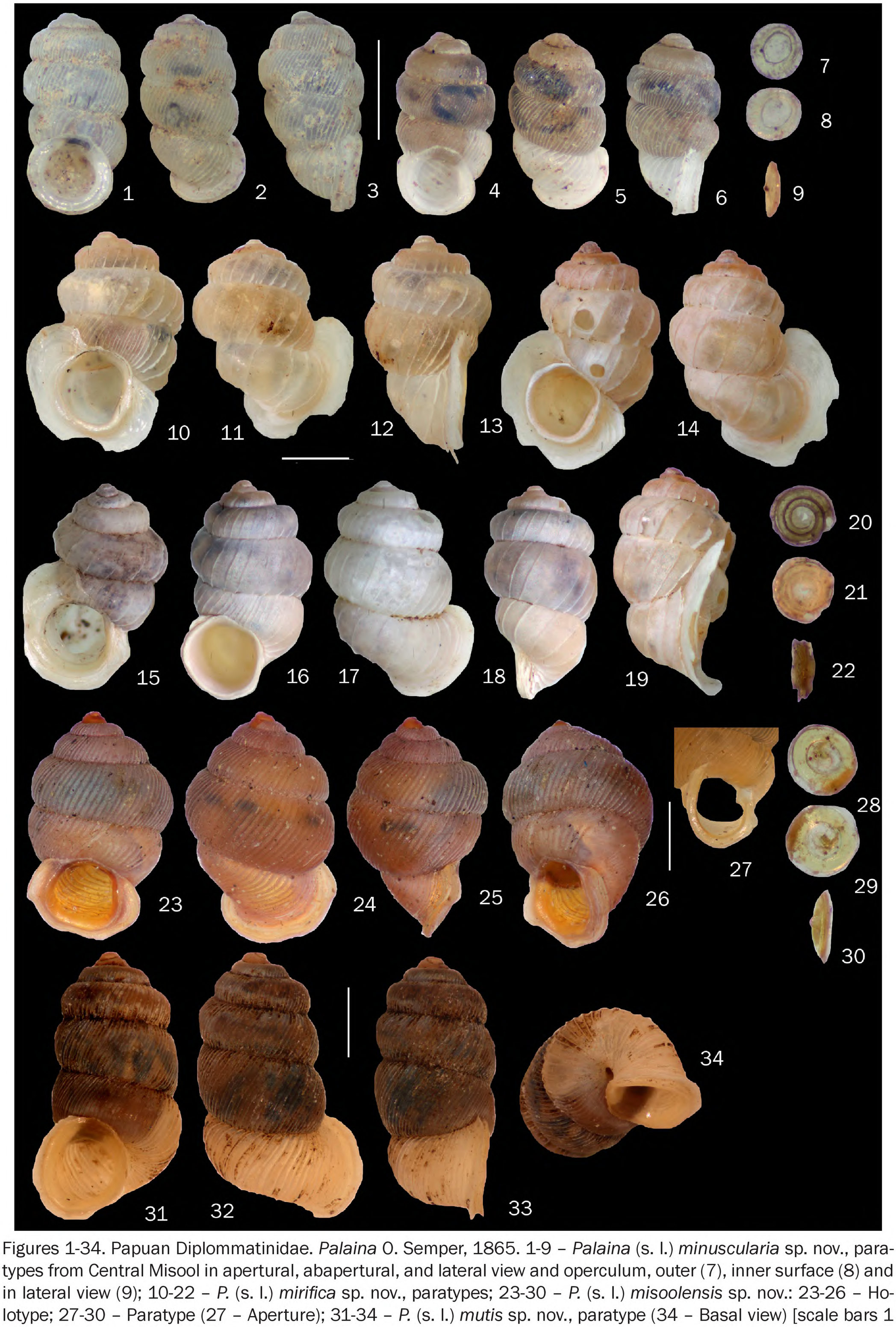
Figures 1-31. Papuan Diplommatinidae. *Palaina* O. Semper, 1865. 1-9 – *Palaina* (s. l.) *gardneri* Dell, 1955: 1-3 – Holotype in apertural, abapertural, and lateral view; photos: MONZ; 4-7 – Holotype *P. delli* Clench, 1965 (7 – Top view); photos: MCZ; 8-9 – Paratype *P. delli*; 10-12 – *P.* (s. l.) *floridensis* Solem, 1960, holotype; photos: UMMZ; 13-16 – *P.* (s. l.) *granulum* I. et B. Rensch, 1929, lectotype; 17-22 – *P.* (s. l.) *hartmanni* sp. nov., paratype with operculum, outer (20), inner surface (21), and lateral view (22); 23-25 – *P.* (s. l.) *iha* sp. nov., paratype; 26-28 – *P.* (s. l.) *insulana* sp. nov., paratype; 29-31 – *P.* (s. l.) *inconspicua* van Benthem Jutting, 1963, holotype; photos: NMNL [scale bars 1 mm].



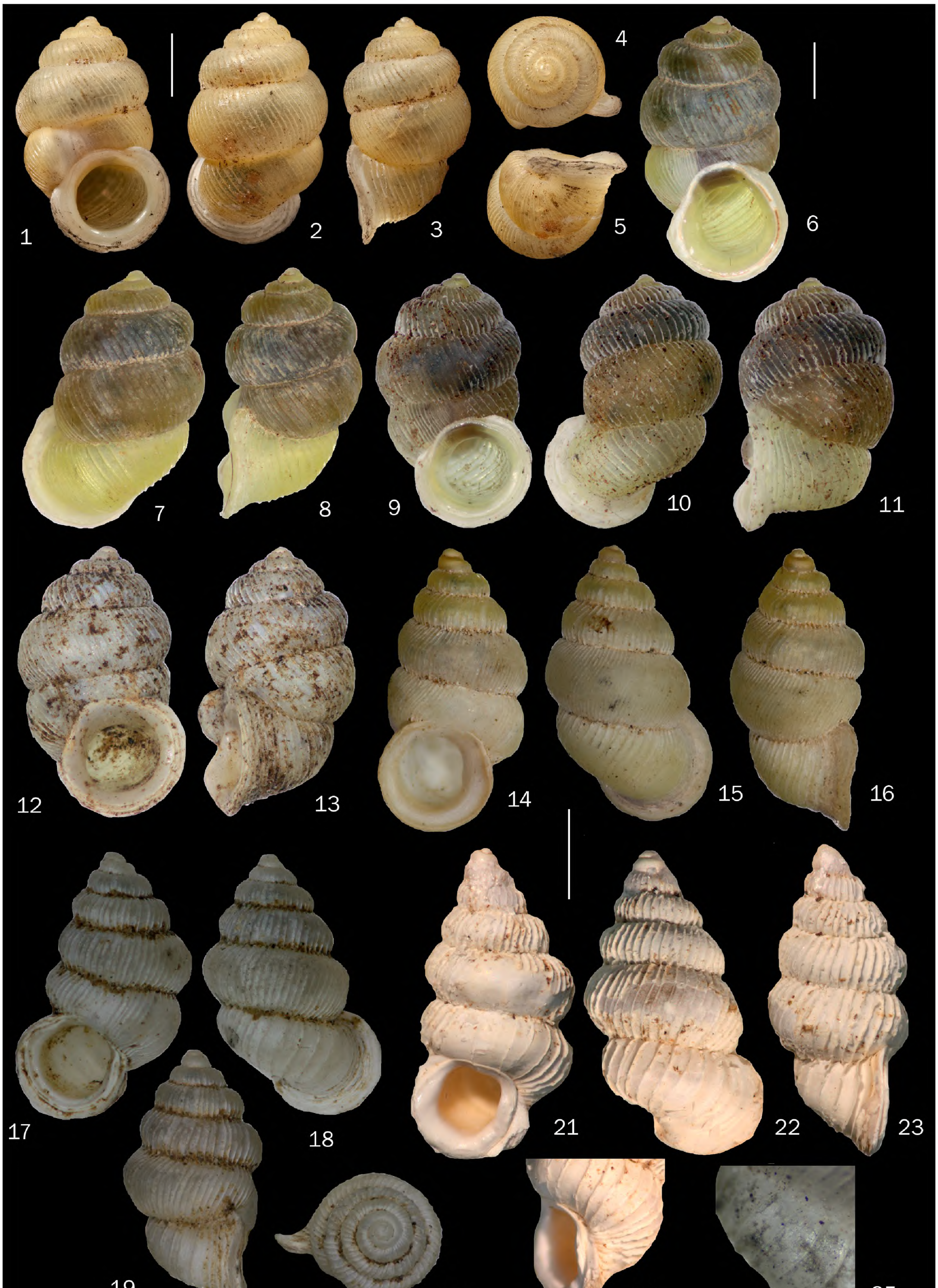
Figures 1-32. Papuan Diplommatinidae. *Palaina* O. Semper, 1865. 1-4 – *Palaina* (s. l.) *laszloi* sp. nov., holotype in apertural, abapertural, lateral, and basal view; 5-11 – *P.* (s. l.) *lengguru* sp. nov., paratype with with operculum, outer (9), inner surface (10), and lateral view (11); 12-14 – *P.* (s. l.) *leptotoreutos* van Benthem Jutting, 1958, holotype; photos: NMNL; 15-17 – *P.* (s. l.) *liliputana* van Benthem Jutting, 1963, holotype; photos: NMNL; 18-23 – *P.* (s. l.) *louisiade* sp. nov., holotype (21 – Basal view); 24-32 – *P.* (s. l.) *mairasi* sp. nov.: 24-26 & 30-32 – Paratype from Lobo vill. (Indonesian New Guinea); 27-29 – Paratype from Lake Kamakawalar env. (Indonesian New Guinea) [scale bars 1 mm].



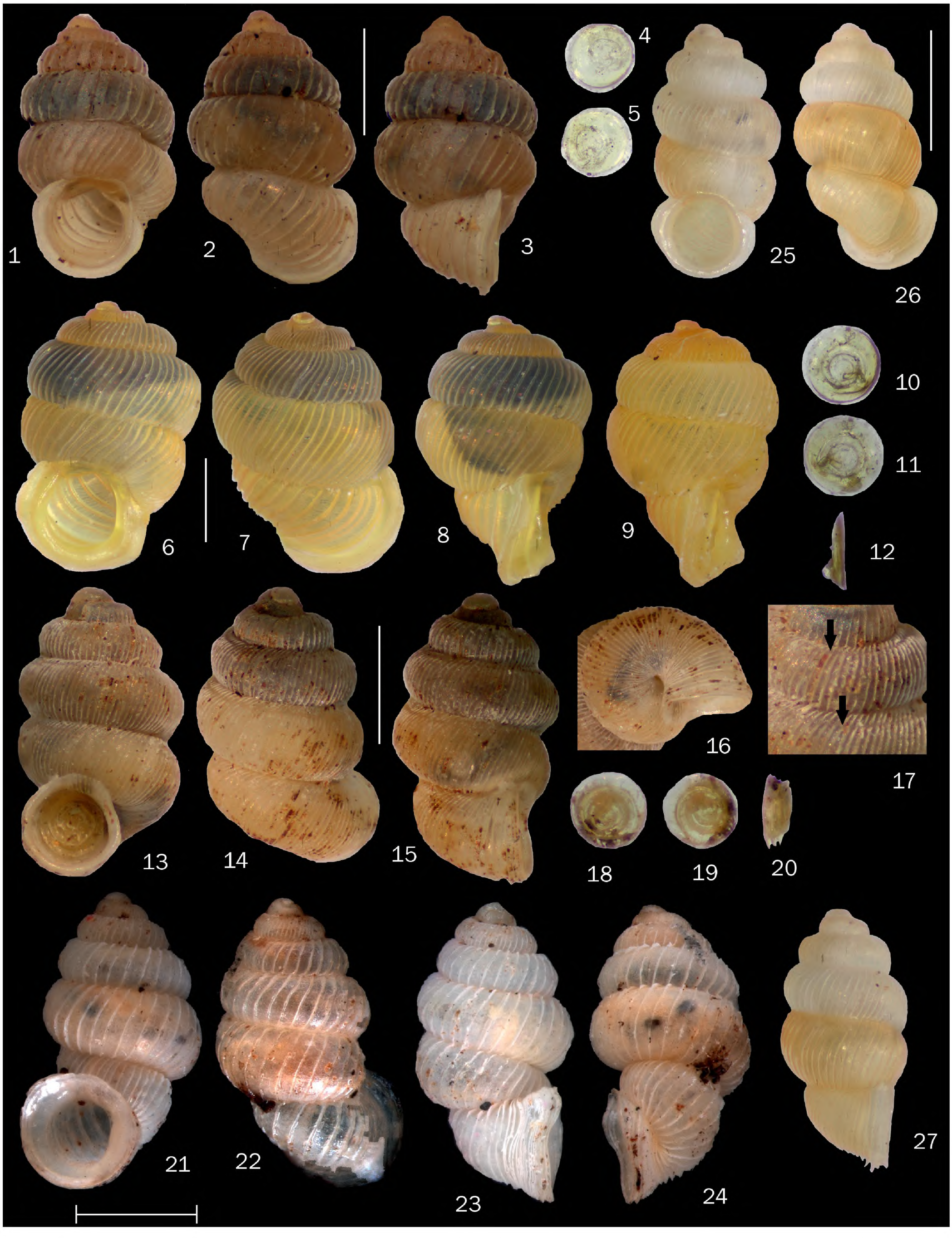
Figures 1-26. Papuan Diplommatinidae. *Palaina* O. Semper, 1865. 1-9 – *Palaina* (s. l.) *manggaraica* (B. Rensch, 1931): 1-3 – Holotype in apertural, abapertural, and lateral view; 4-9 – Specimens from Mount Ranaka (Flores Island); 10-13 – *P.* (s. l.) *megalostoma* sp. nov., holotype (13 – Basal view); 14-16 – *P.* (s. l.) *aerari* (Dell, 1955) - holotype *P.* (s. l.) *megamorpha* Solem, 1960; photos: UMMZ; 17-23 – *P.* (s. l.) *mengen* sp. nov.: 17-20 – Holotype; 21-23 – Paratype, operculum, outer (21), inner surface (22) and lateral view (23); 24-26 – *P.* (s. l.) *minutula* sp. nov., holotype [scale bars 1 mm].



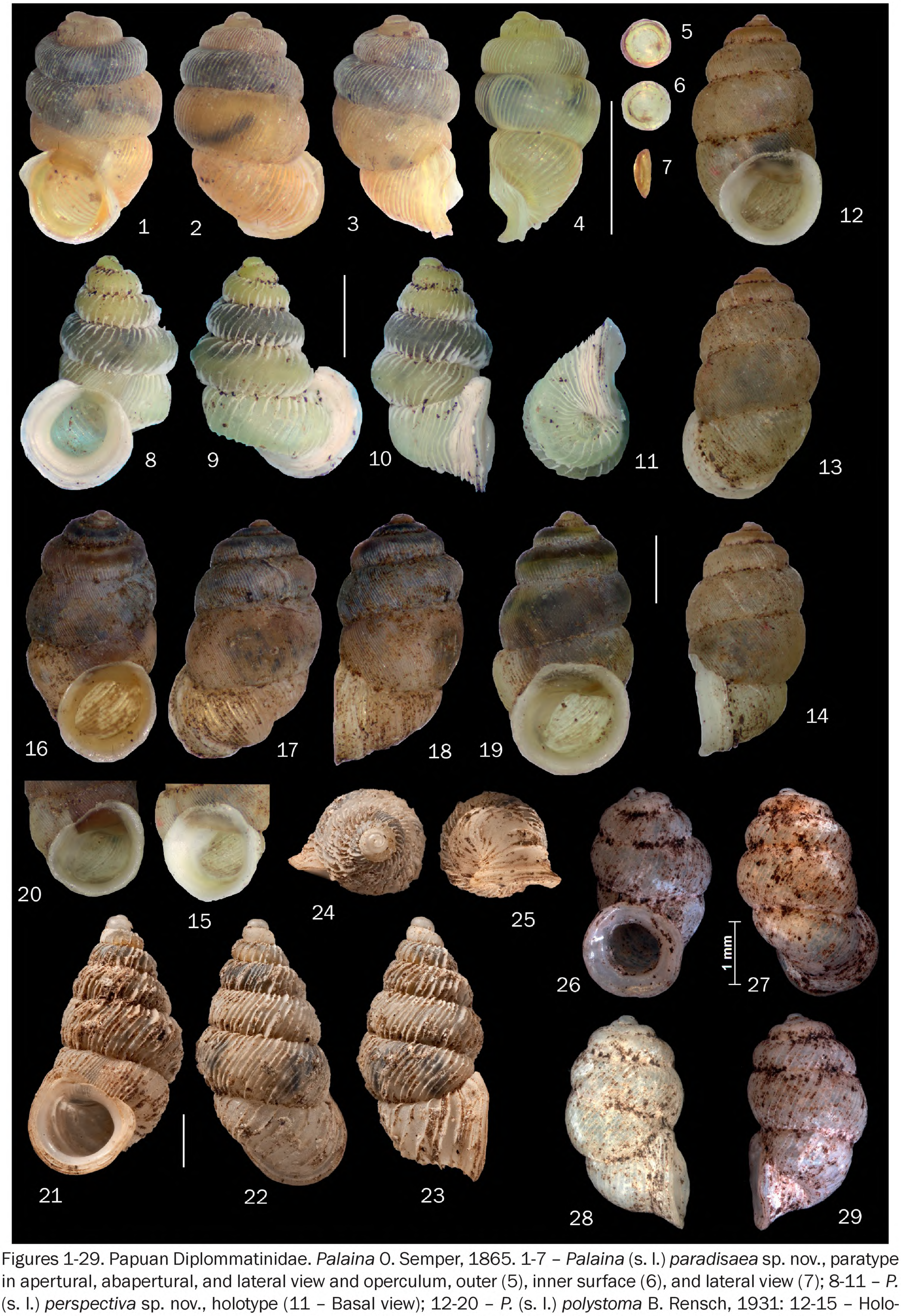
Figures 1-34. Papuan Diplommatinidae. *Palaina* O. Semper, 1865. 1-9 – *Palaina* (s. l.) *minuscularia* sp. nov., paratypes from Central Misool in apertural, abapertural, and lateral view and operculum, outer (7), inner surface (8) and in lateral view (9); 10-22 – *P.* (s. l.) *mirifica* sp. nov., paratypes; 23-30 – *P.* (s. l.) *misoolensis* sp. nov.: 23-26 – Holotype; 27-30 – Paratype (27 – Aperture); 31-34 – *P.* (s. l.) *mutis* sp. nov., paratype (34 – Basal view) [scale bars 1 mm].



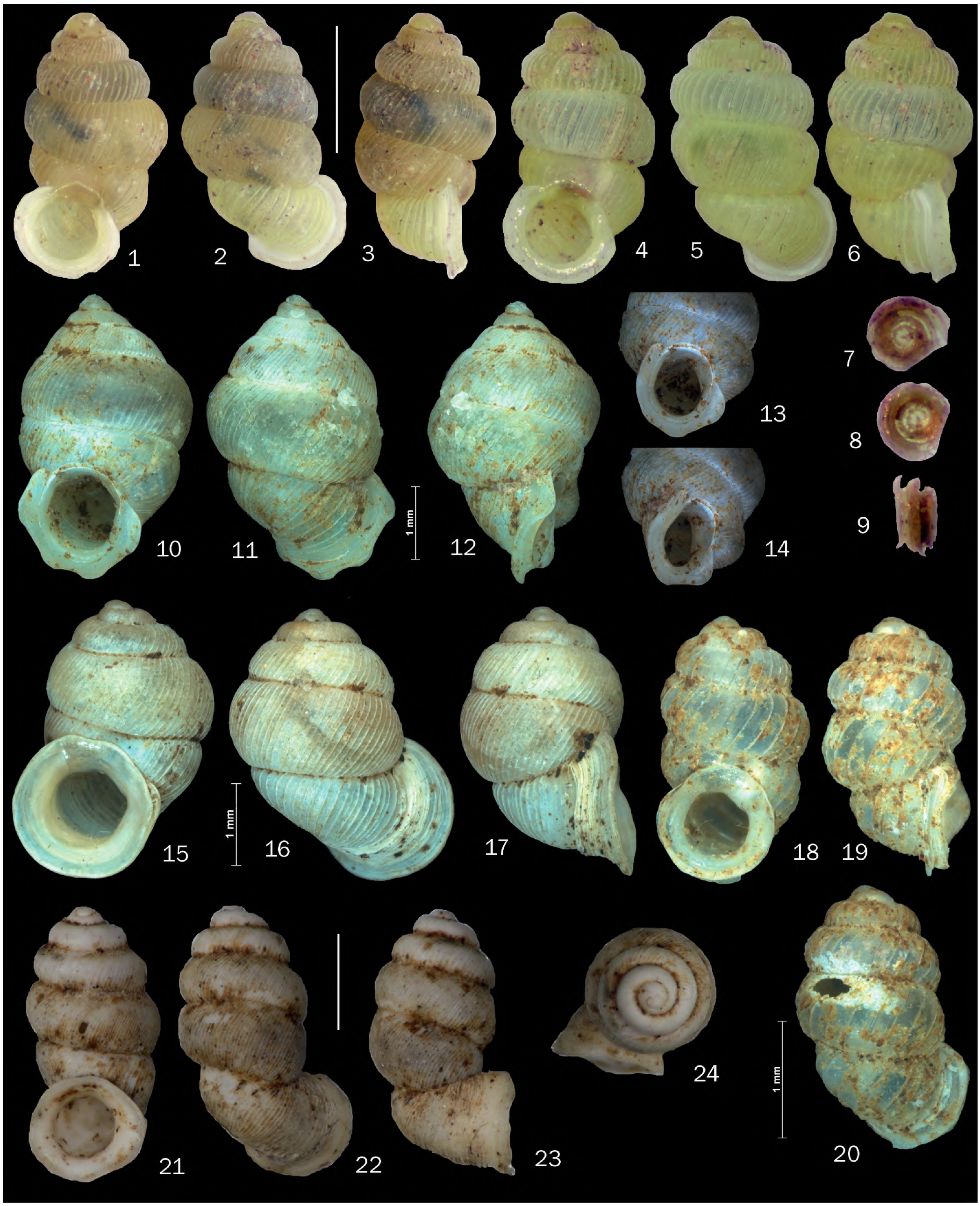
Figures 1-25. Papuan Diplommatinidae. *Palaina* O. Semper, 1865. 1-13 – *Palaina* (s. l.) *novoguineensis* E.A. Smith, 1897: 1-5 – Lectotype in apertural, abapertural, lateral, top, and basal view; photos: BMNH; 6-8 – Specimen from Fak Fak env. (Onin Peninsula, Indonesian New Guinea); 9-11 – Specimen from Lilinta vill. env. (Misool Isand); 12-13 – Specimen from Kaimana env. (Indonesian New Guinea); 14-25 – *P.* (s. l.) *novopommerana* I. et B. Rensch, 1929: 14-16 – Lectotype; 17-20 & 25 – Syntype *P. vexator* I. et B. Rensch, 1929; 21-24 – Specimen from Marmar vill. env. (New Britain) [scale bars 1 mm].



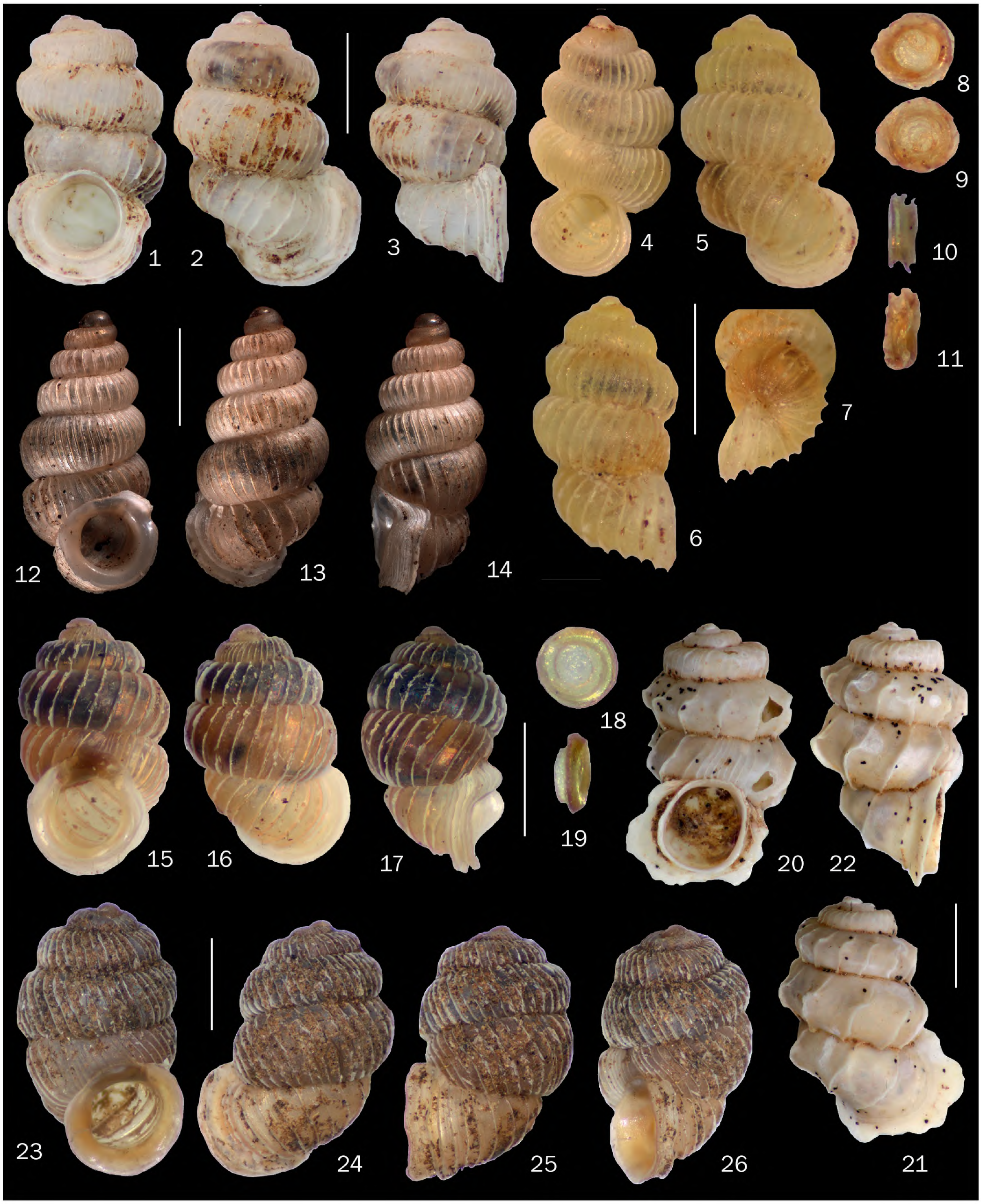
Figures 1-27. Papuan Diplommatinidae. *Palaina* O. Semper, 1865. 1-5 – *Palaina* (s. l.) *obiensis* sp. nov.: 1-3 – Holotype in apertural, abapertural, and lateral view; 4-5 – Paratype, operculum, outer (4), inner surface (5); 6-12 – *P.* (s. l.) *onin* sp. nov.: 6-9 – Holotype; 10-12 – Paratype (12 – Operculum in lateral view); 13-20 – *P.* (s. l.) *papuamontis* sp. nov., paratype (16 – Basal view, 17 – Consider black arrows pointing to changing ribs height); 21-24 – *P.* (s. l.) *papuanorum* Soós, 1911, lectotype; photos: NMNL; 25-27 – *P.* (s. l.) *yamdena* sp. nov., paratype [scale bars 1 mm].



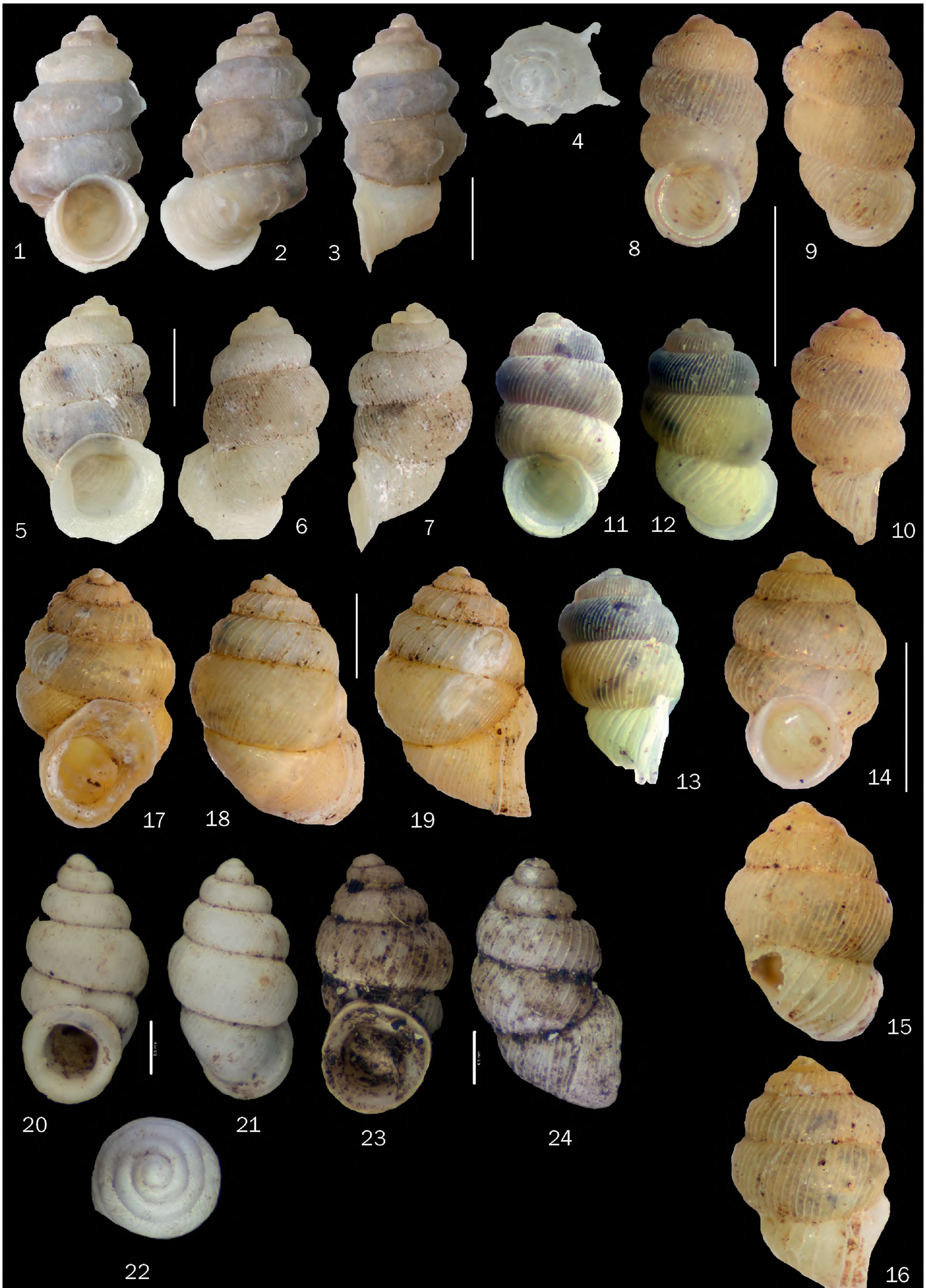
Figures 1-29. Papuan Diplommatinidae. *Palaina* O. Semper, 1865. 1-7 – *Palaina* (s. l.) *paradisaea* sp. nov., paratype in apertural, abapertural, and lateral view and operculum, outer (5), inner surface (6), and lateral view (7); 8-11 – *P.* (s. l.) *perspectiva* sp. nov., holotype (11 – Basal view); 12-20 – *P.* (s. l.) *polystoma* B. Rensch, 1931: 12-15 – Holotype; 16-20 – Specimens from Mount Ranaka (Flores Island); 21-25 – *P.* (s. l.) *ponsonbyi* Sykes, 1903, paratype (24 – Top view; 25 – Basal view); photos: BMNH; 26-29 – *P.* (s. l.) *propinqua* van Benthem Jutting, 1963, holotype; photos: NMNL [scale bars 1 mm].



Figures 1-24. Papuan Diplommatinidae. *Palaina* O. Semper, 1865. 1-9 – *Palaina* (s. l.) *psittricha* sp. nov., paratypes in apertural, abapertural, and lateral view and operculum, outer (7), inner surface (8), and lateral view (9); 10-14 – *P.* (s. l.) *quadricornis* van Benthem Jutting, 1958, holotype; photos: NMNL; 15-17 – *P.* (s. l.) *repandostoma* van Benthem Jutting, 1963, holotype; photos: NMNL; 18-20 – *P.* (s. l.) *scaveola* van Benthem Jutting, 1958, holotype; photos: NMNL; 21-24 – *P.* (s. l.) *schneideri* I. et B. Rensch, 1929, lectotype (24 – Top view) [scale bars 1 mm].



Figures 1-26. Papuan Diplommatinidae. *Palaina* O. Semper, 1865. 1-3 – *Palaina* (s. l.) *silvicultrix* sp. nov., paratype in apertural, abapertural, and lateral view; 4-11 – *P.* (s. l.) *slapcinskyi* sp. nov.: 4 – Holotype; 5-11 – Paratypes (7 – Basal view) and operculum, outer (8), inner surface (9), and lateral view (10-11); 12-14 – *P.* (s. l.) *solomonensis* (Dell, 1955), holotype; photos: MONZ; 15-19 – *P.* (s. l.) *sparselamellata* sp. nov., holotype; 20-22 – *P.* (s. l.) *tanimbarensis* sp. nov., paratype; 23-26 – *P.* (s. l.) *telnovi* sp. nov., holotype [scale bars 1 mm].



Figures 1-24. Papuan Diplommatinidae. *Palaina* O. Semper, 1865. 1-4 – *Palaina* (s. l.) *thomasrinteleni* sp. nov., paratypes in apertural, abapertural, and lateral view and juvenile specimen in top view; 5-7 – *P.* (s. l.) *vermeuleni* sp. nov., holotype; 8-13 – *P.* (s. l.) *waigeo* sp. nov.: 8-10 – Paratype from 4.5 km SW Waisai (Waigeo); 11-13 – Paratype from 3 km W Waisai (Waigeo); 14-16 – *P.* (s. l.) *imperfecta* sp. nov., holotype; 17-19 – *P.* (s. l.) *wawiyai* sp. nov., holotype; 20-24 – *P.* (s. l.) *wisemani* (Cox, 1870): 20-22 – Specimen from Makira (Solomon Islands) (22 – Top view); 23-24 – Specimen from Owaraha (Solomon Islands); photos: MCZ [scale bars 1 mm, figs 20-24 scale bars 0.5 mm].



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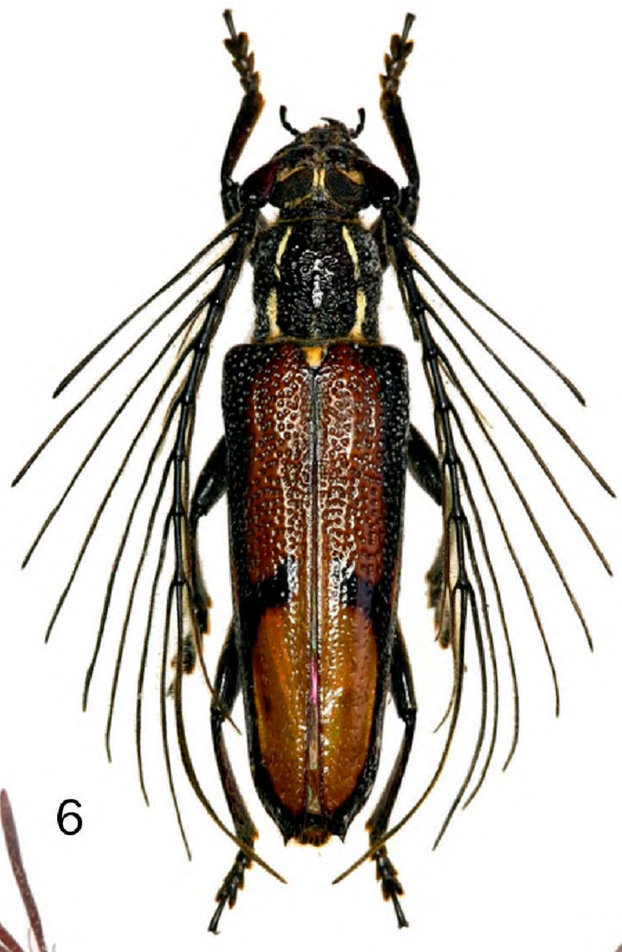
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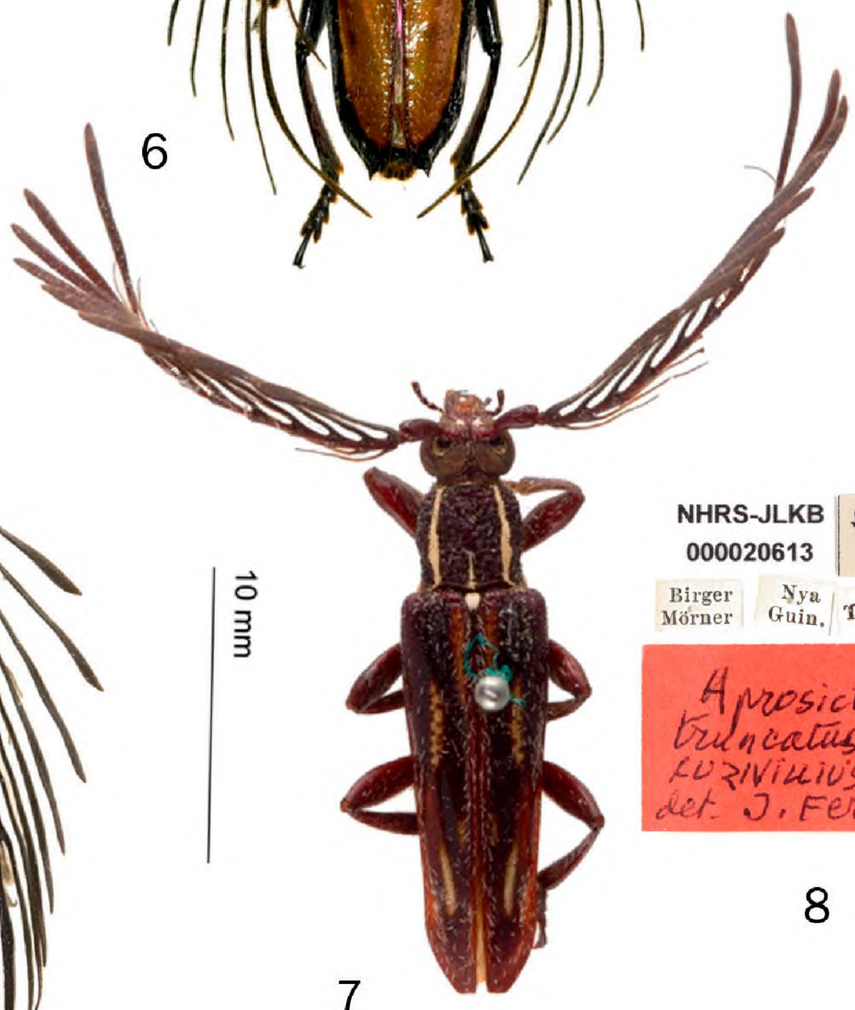
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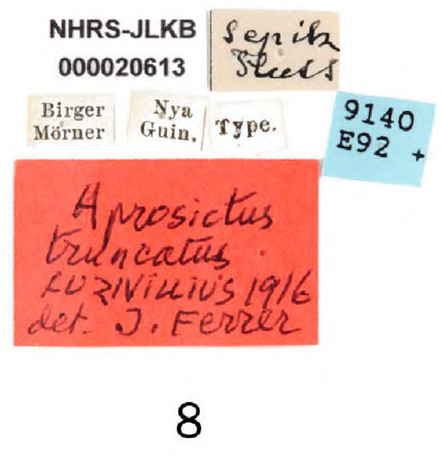
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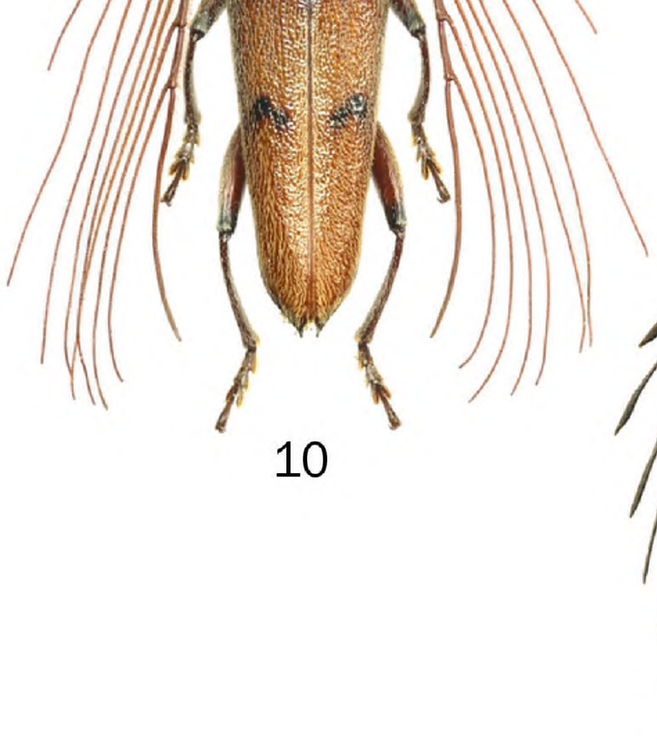
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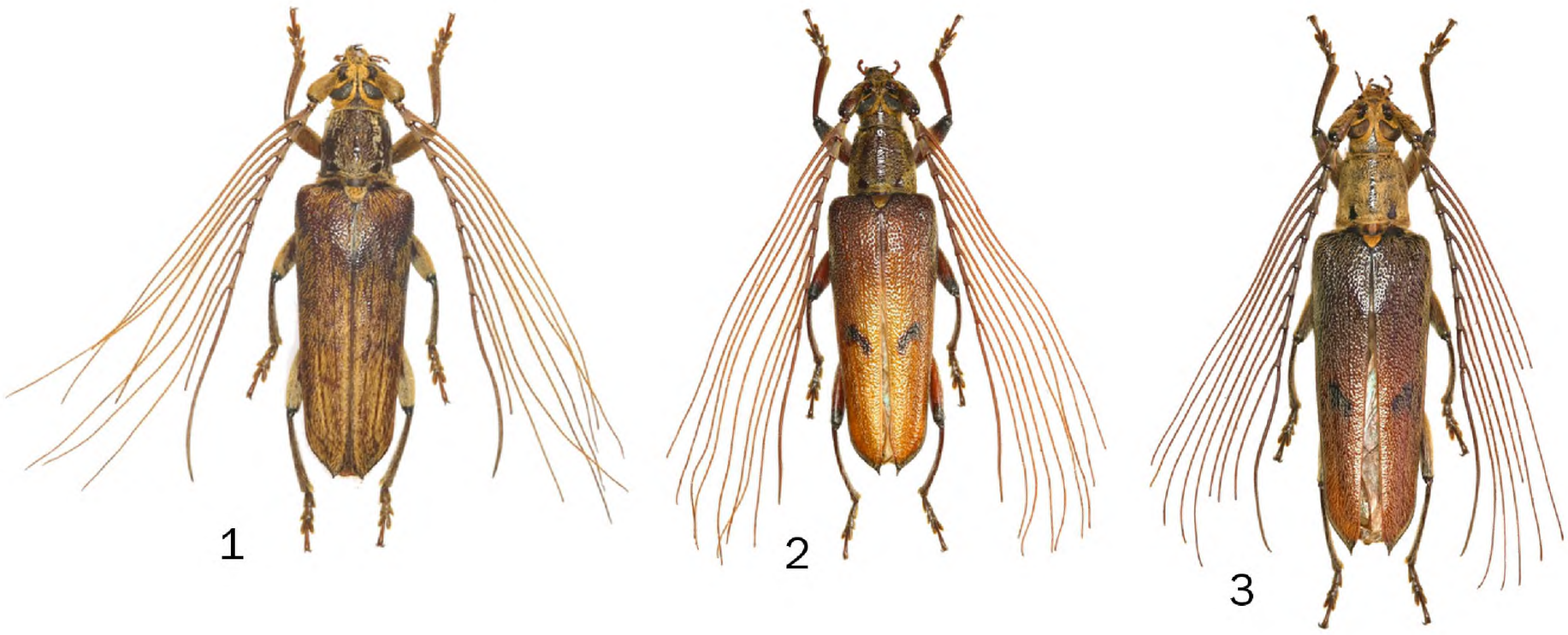


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Figures 1-10. Strongylurini species, habitus in dorsal view and original labels. 1-3 – *Duplipectus bilineatus* (Ritsema, 1881): 1 – Holotype ♂; 2 – Holotype labels; 3 – ♂ from Halmahera Island; 4-5 – *D. buruensis* sp. nov.: 4 – Holotype ♂; 5 – Allotype (paratype) ♀; 6 – *D. degroofi* sp. nov., holotype ♂; 7-9 – *D. truncatus* (Aurivillius, 1916): 7 – Holotype ♂; 8 – Holotype labels; 9 – ♂ from West Papua; 10 – *Aprosictus acutipennis* sp. nov., holotype ♂.



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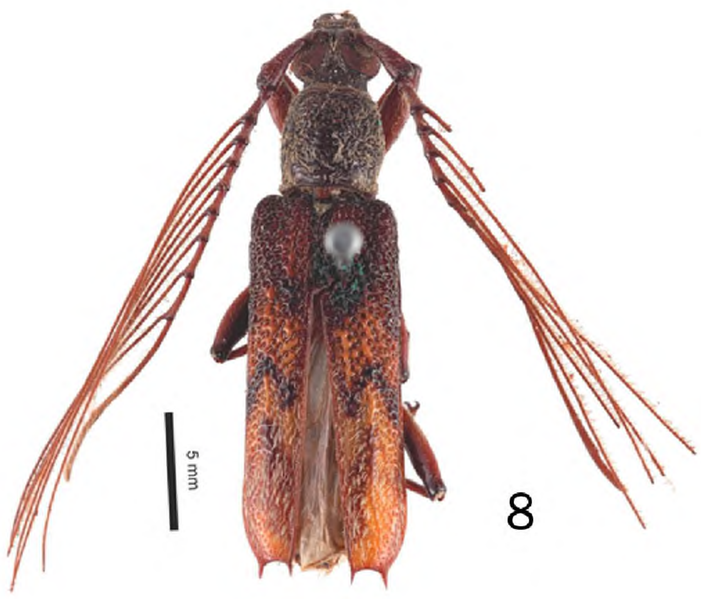
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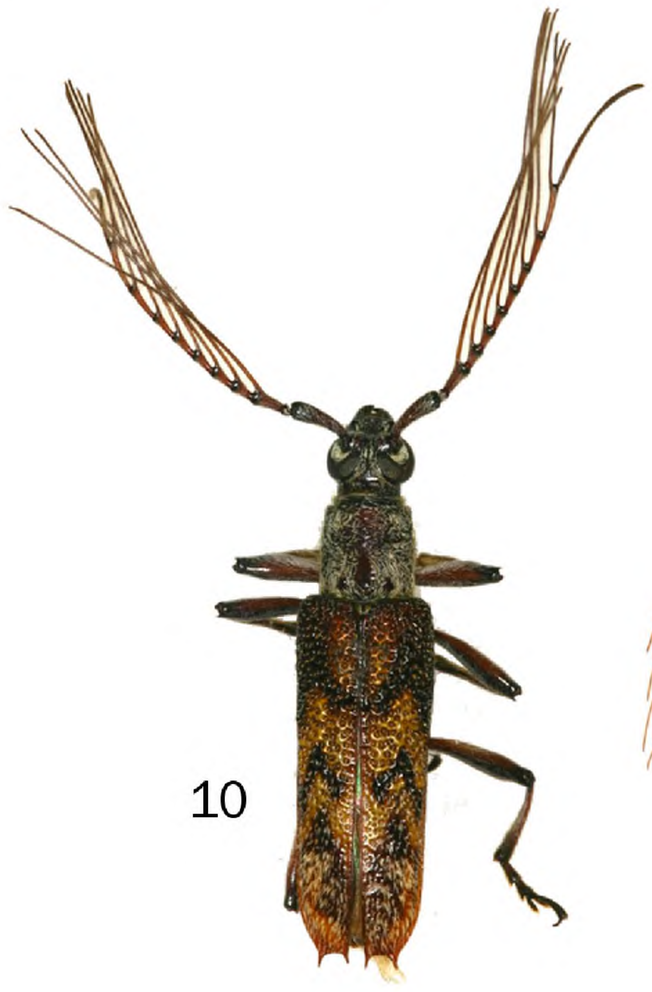
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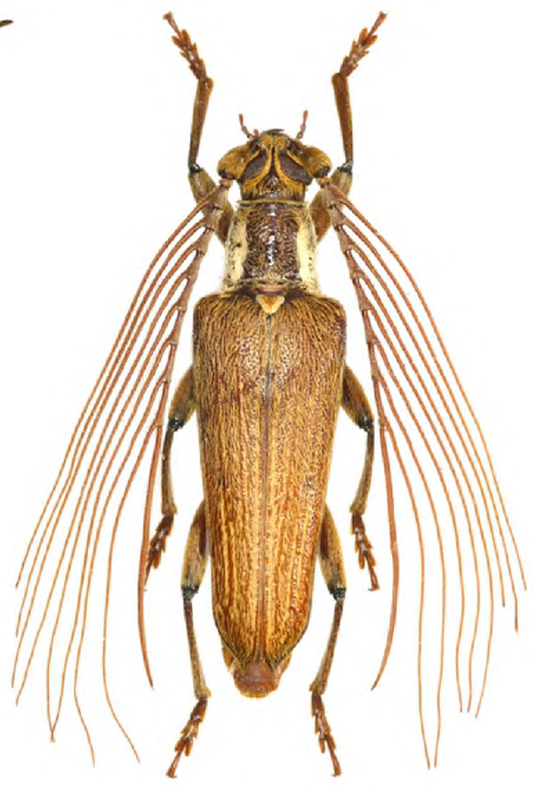
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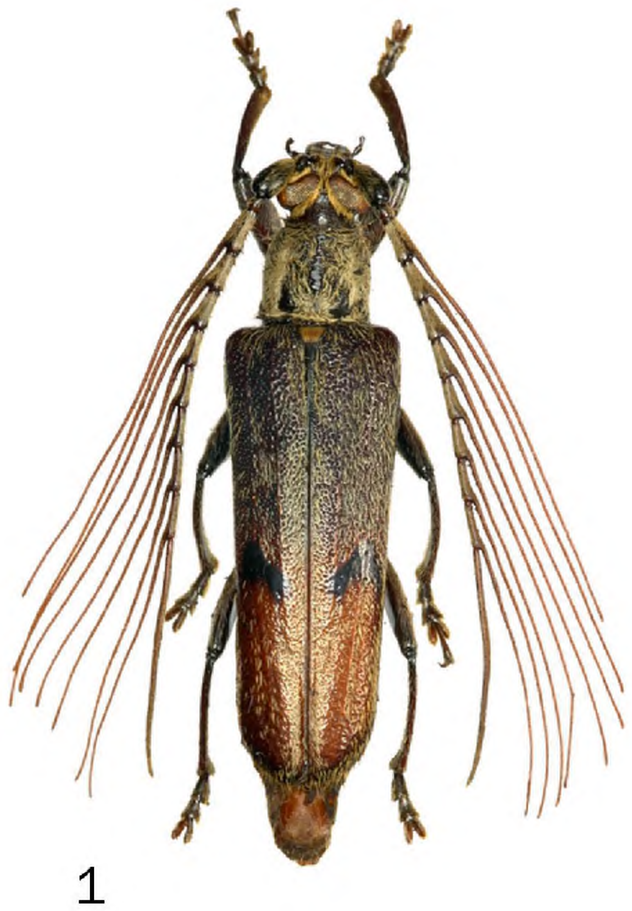


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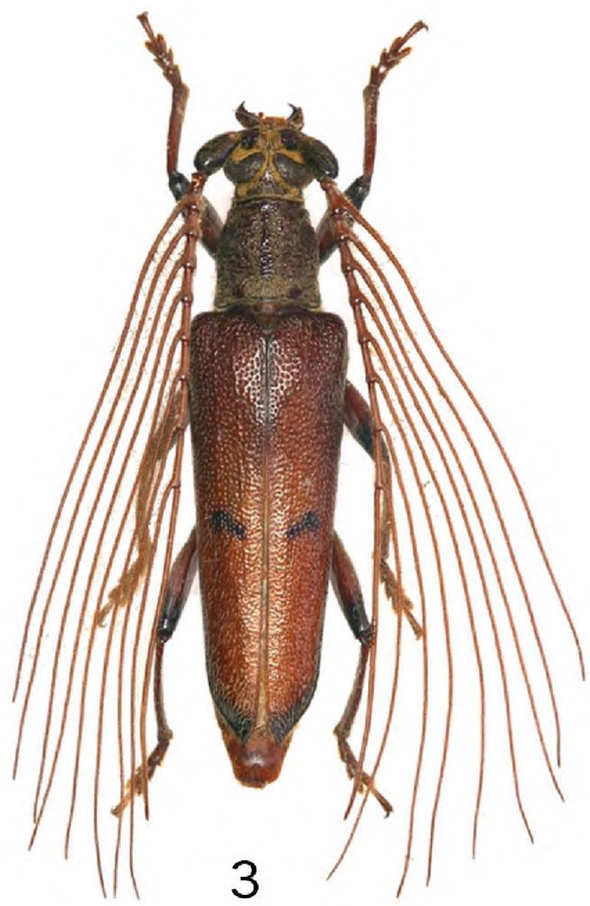
Figures 1-11. Strongylurini species, habitus in dorsal view and original labels. 1 – *Aprosictus armellae* sp. nov., holotype ♂; 2 – *A. dilatoscapus* sp. nov., holotype ♂; 3-4– *A. duivenbodei* (Kaup, 1866): 3 – ♂ from Sulawesi Island; 4 – ♀ from Sulawesi Island; 5 – *A. exiguus* sp. nov., holotype ♂; 6 – *A. fuscus* sp. nov., holotype ♂; 7 – *A. glabrofasciatus* sp. nov., holotype ♂; 8-10 – *A. intricatus* Blackburn, 1889: 8 – Holotype ♂; 9 – Holotype labels; 10 – ♂ from Queensland, Australia; 11 – *A. lombokensis* sp. nov., holotype ♂.



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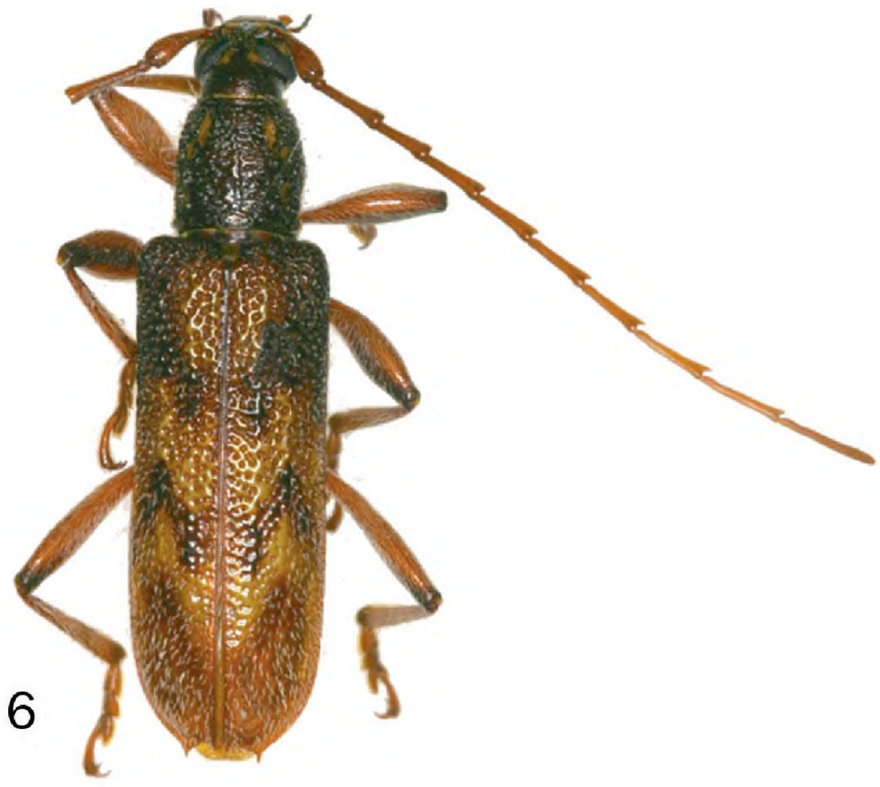
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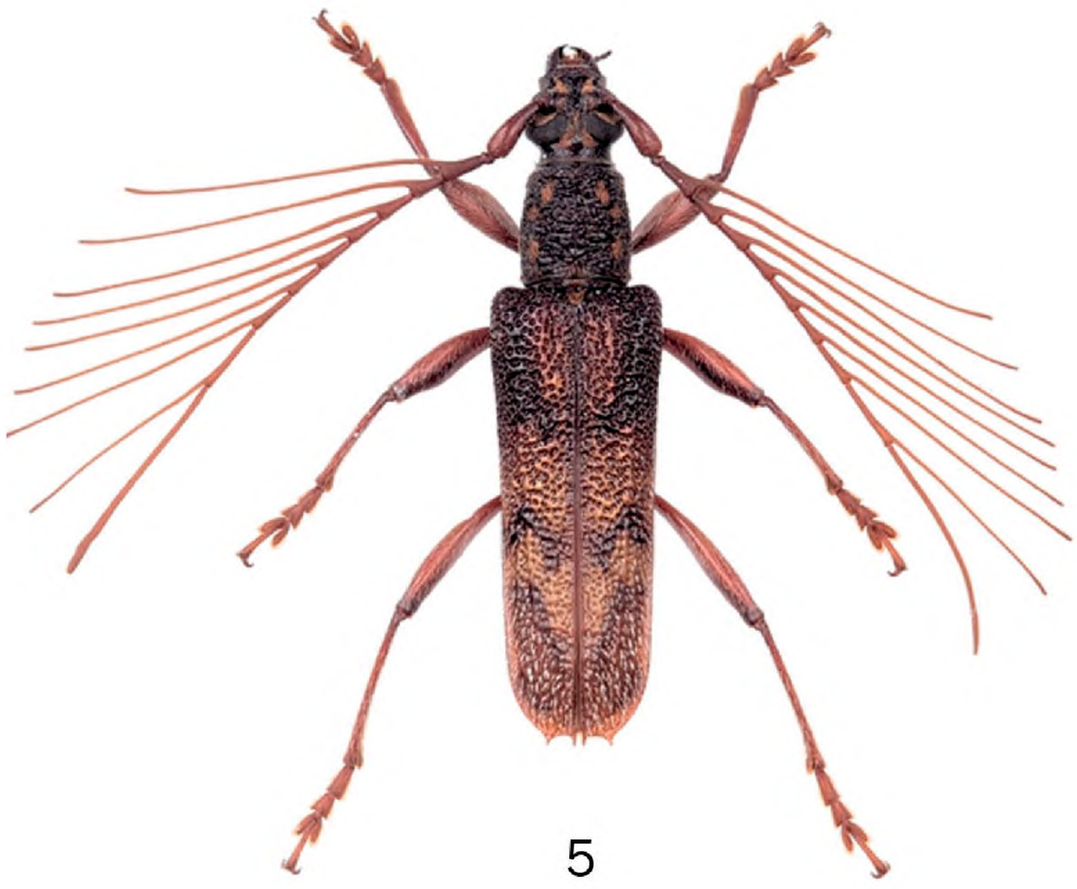
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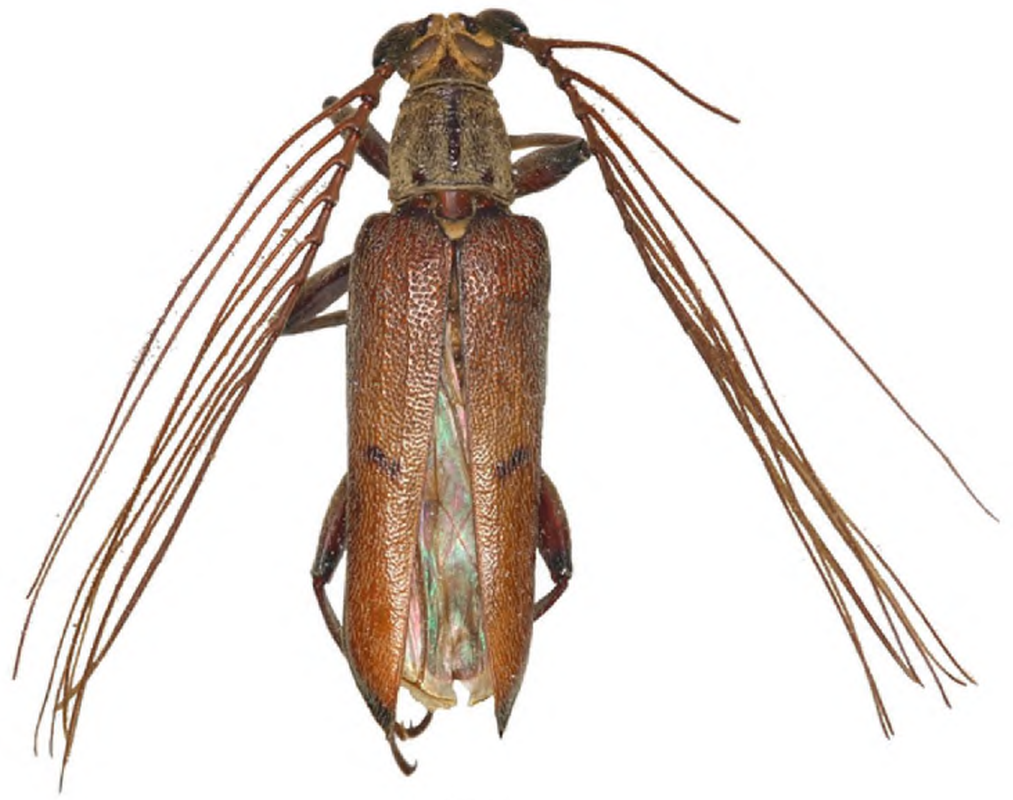
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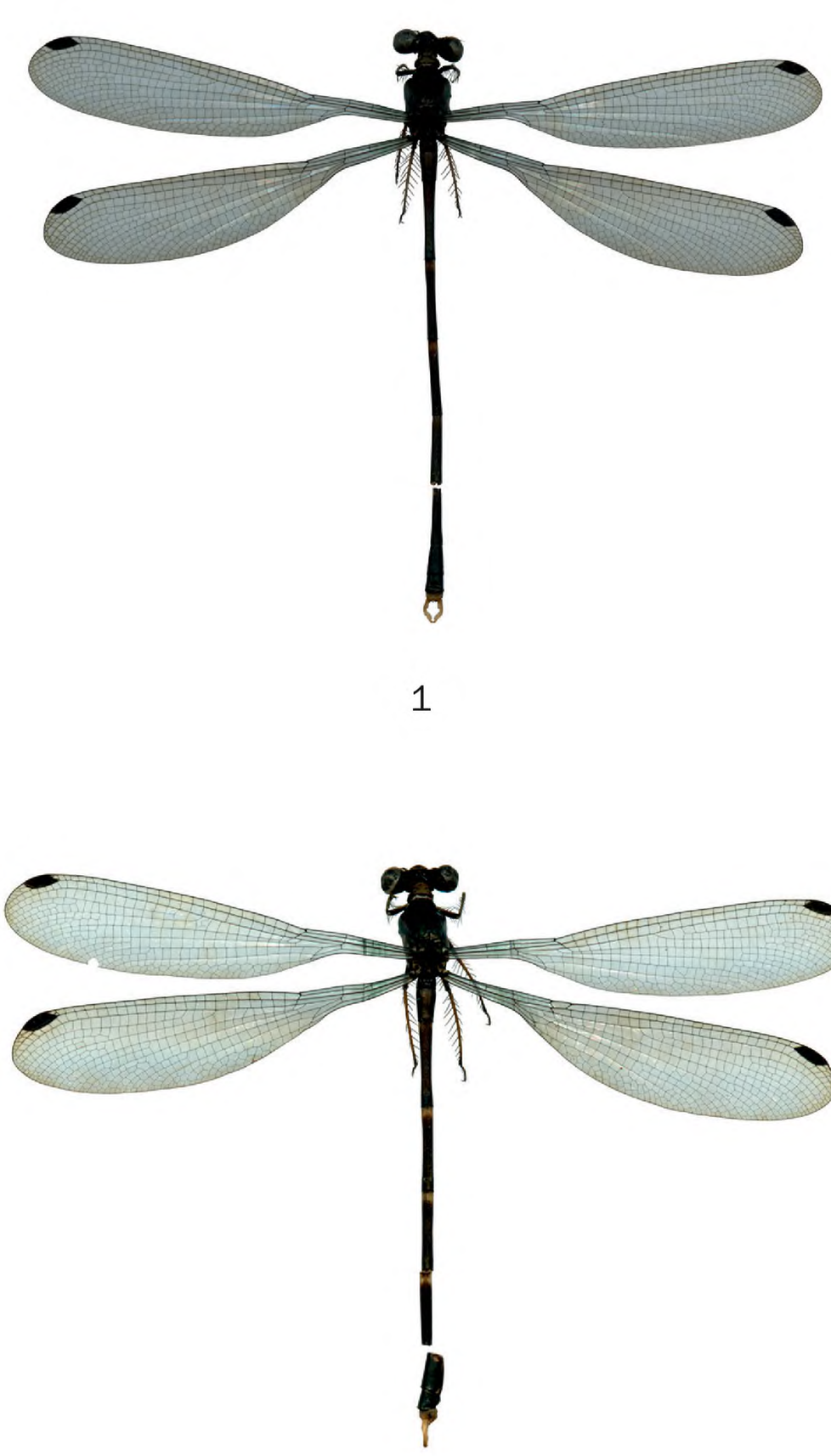
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Figures 1-8. Strongylurini species, habitus, dorsal view. 1 – *Aprosictus paloloensis* sp. nov., holotype ♂; 2– *A. pedicellus* sp. nov., holotype ♂; 3-4 – *A. sangirensis* sp. nov.: 3 – Holotype ♂; 4 – Paratype ♀; 5-6 – *A. sexpunctatus* sp. nov.: 5 – Holotype ♂; 6 – Allotype (paratype) ♀; 7 – *A. ternatensis* sp. nov., holotype ♂; 8 – *A.* sp., unlabelled ♀ specimen from MNHN.

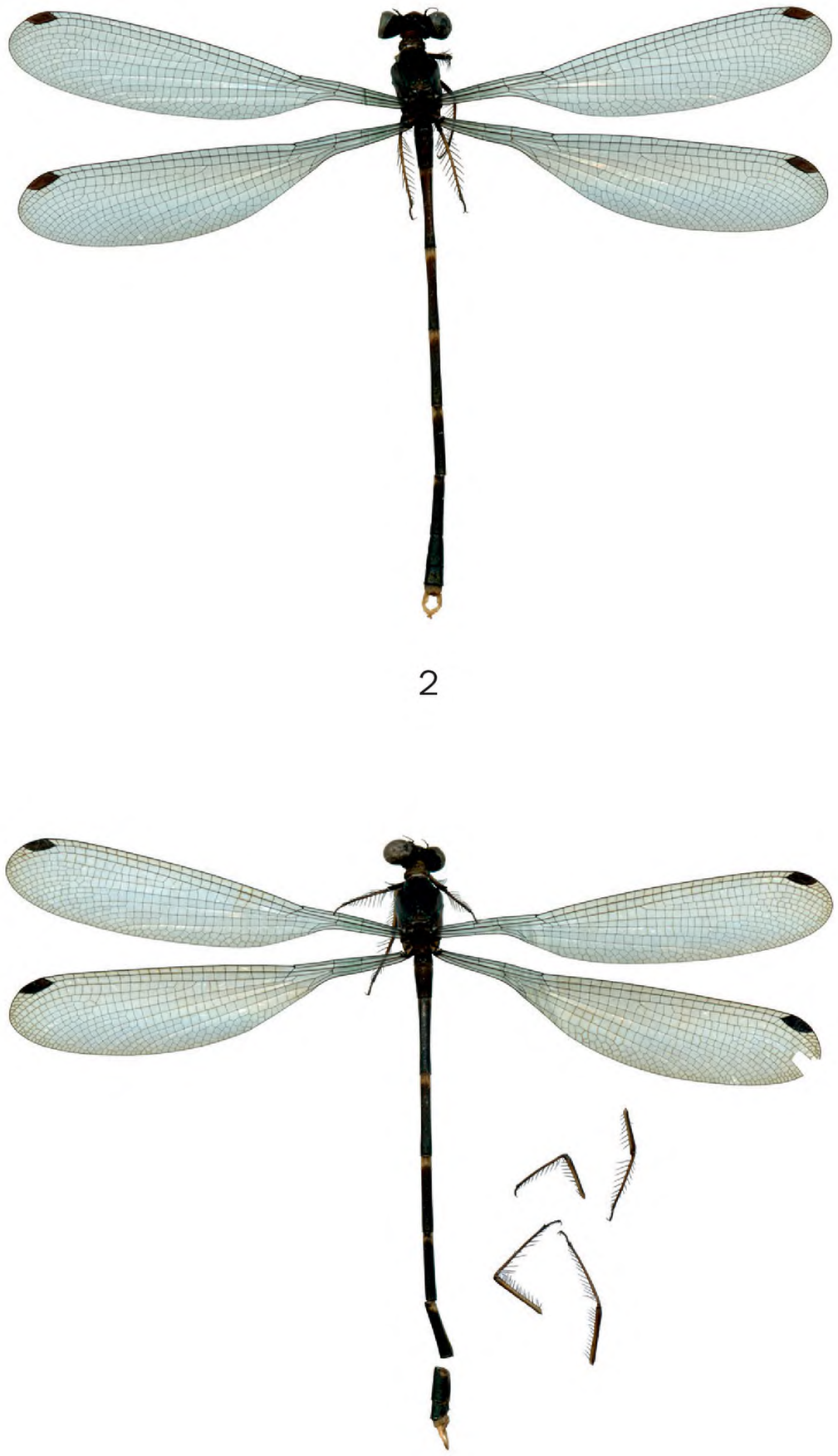
Figures 1-8. *Endelus* species, dorsal view. 1 – *E.* (*Papuadelus* subgen. nov.) *telnovi* sp. nov. (holotype NME; photo: A. Saribekyan); 2 – *E.* (s. str.) *inaequalipennis* Obenberger, 1937 (lectotype NMPC; photo: M. Kalashian); 3 – *E.* (s. str.) *chalybaeotinctus* Obenberger, 1932 (lectotype NMPC; photo: M. Kalashian); 4 – *E.* (s. str.) *bakeri* Kerremans, 1914 (lectotype NMPC; photo: M. Kalashian); 5 – *E.* (s. str.) *belial* Obenberger, 1924 (paralectotype BMNH; photo: Keita Matsumoto, © BMNH); 6 – *E.* (s. str.) *pseudobelial* sp. nov. (paratype NMPC; photo: L. Dembický); 7 – *E.* (s. str.) *bellamyi* sp. nov. (holotype CSCA; photo: A. Saribekyan); 8 – *E.* (s. str.) *palawanensis* Fisher, 1921 (holotype USNM; photo: A. Saribekyan).

Plate 52

KALNIŅŠ, M.: *Argiolestes spungisi* sp. nov. (Odonata: Argiolestidae) from New Guinea



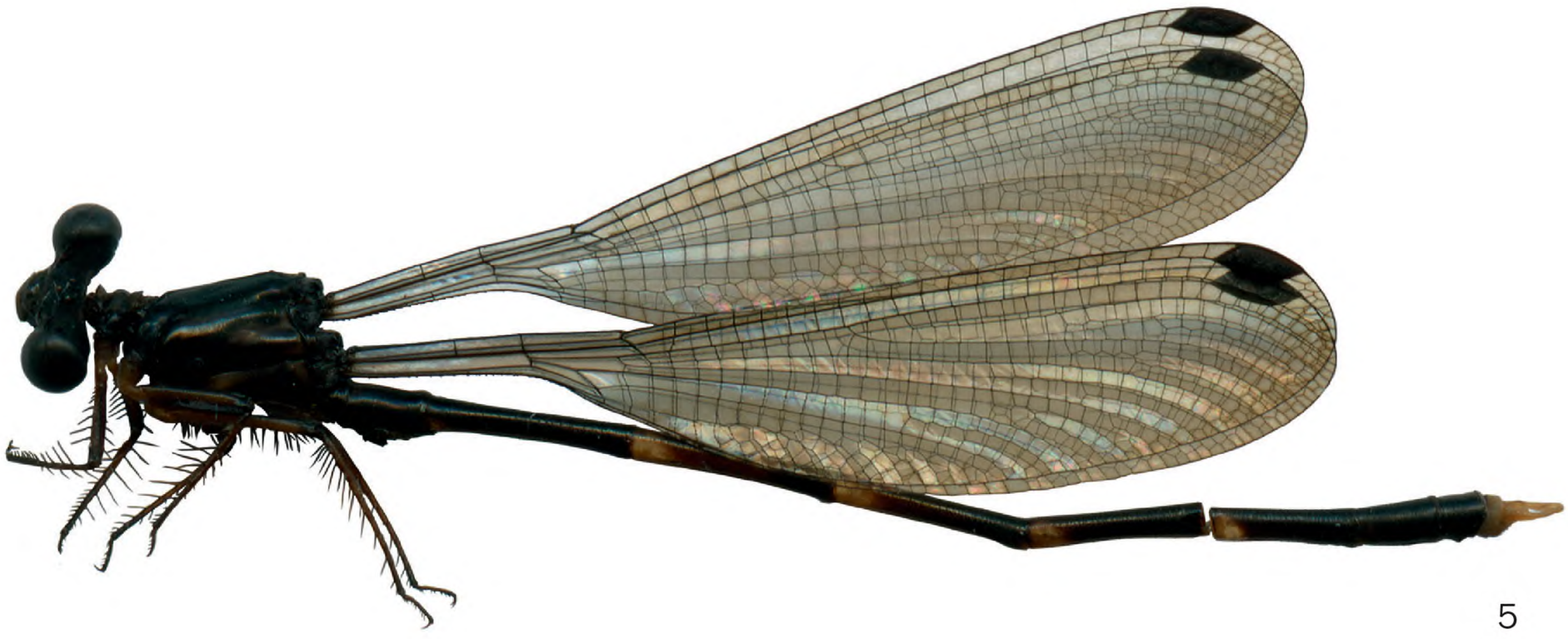
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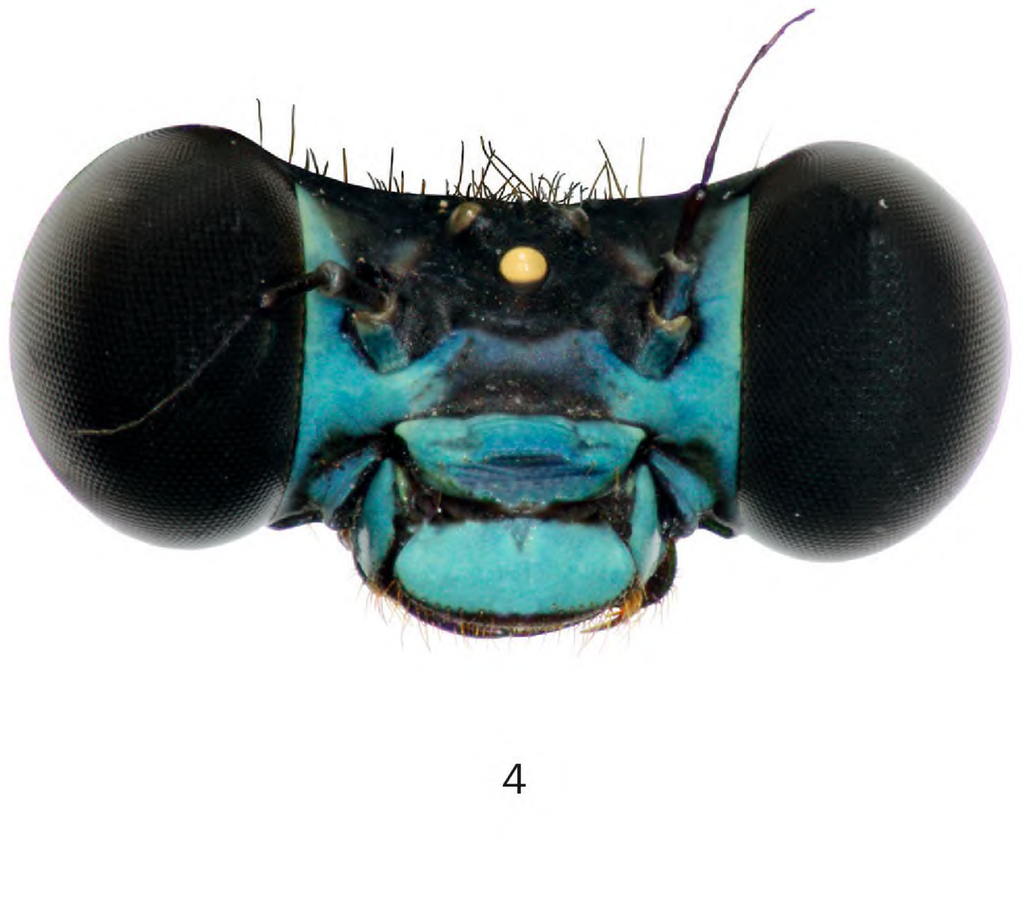
Figures 1-5. *Argiolestes spungisi* sp. nov., males, dorsal (1-4) and lateral (5) view. 1 & 5 – Holotype; 2 – Paratype 1; 3 – Paratype 2; 4 – Paratype 3.

Plate 53

KALNIŅŠ, M.: *Argiolestes spungisi* sp. nov. (Odonata: Argiolestidae) from New Guinea



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Figures 1-5. Papuan *Argiolestes*. 1-3 – *A. spungisi* sp. nov.: 1 – Holotype, head, frontal view; 2 – Holotype, thorax, lateral view; 3 – Paratype 1, thorax, lateral view; 4-5 – *A. australis* (Guérin-Meneville, 1830), specimen from Waisai 10-13 km NE, Waigeo Island: 4 – Head, frontal view; 5 – Thorax, lateral view. Consider lost blue colouration of thorax in figures 2-3 & 5.

Plate 54

KALNIŅŠ, M.: *Argiolestes spungisi* sp. nov. (Odonata: Argiolestidae) from New Guinea



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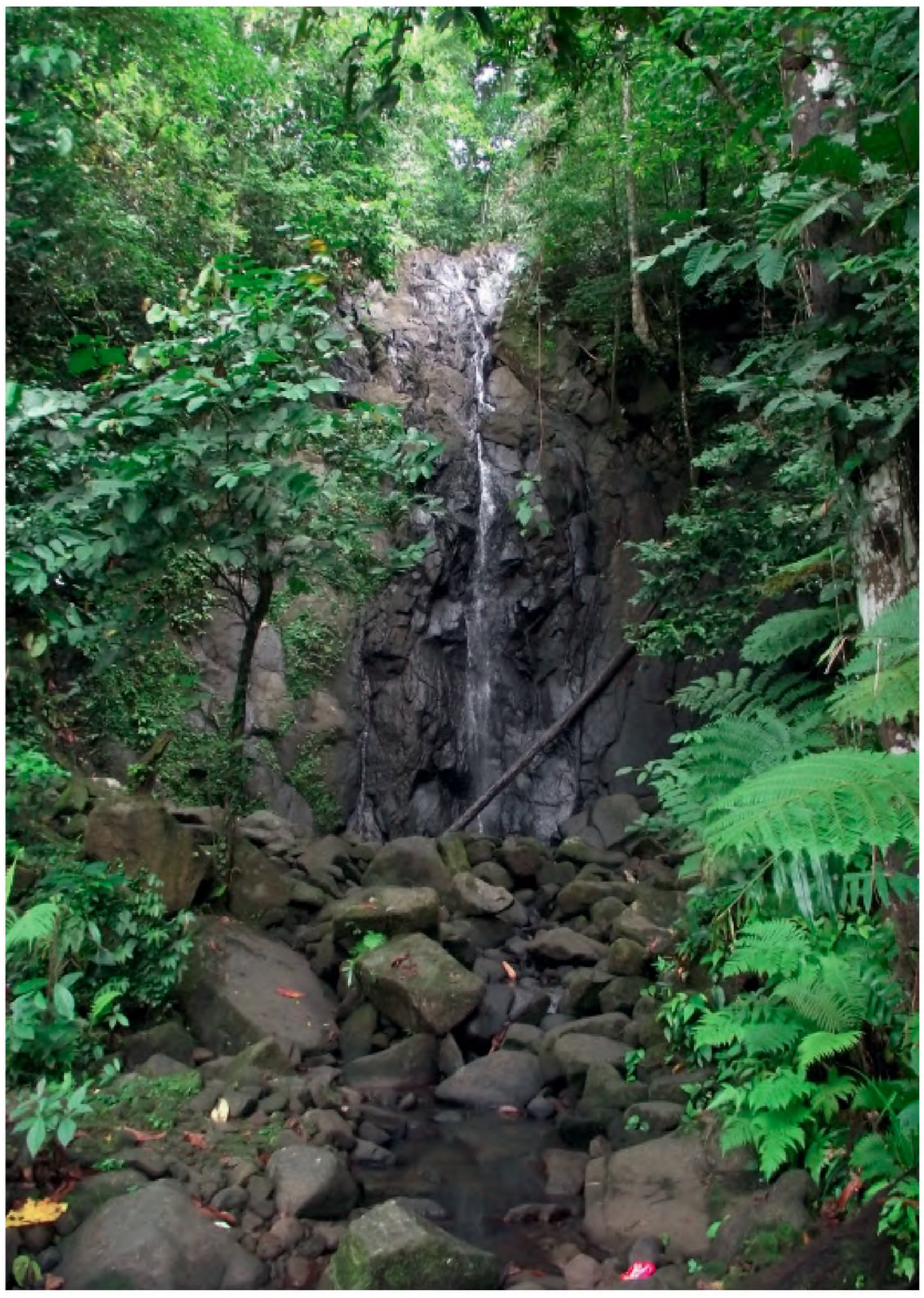


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Figures 1-10. Papuan *Argiolestes*, tip of male abdomen in dorsal (1-4 & 9) and ventral (5-8 & 10) view. 1-8 – *A. spungisi* sp. nov.: 1 & 5 – Holotype; 2 & 6 – Paratype 1; 3 & 7 – Paratype 2; 4 & 8 – Paratype 3; 9-10 – *A. australis* (Guérin-Meneville, 1830), specimen from Waisai 10-13 km NE, Waigeo Island.

Plate 55

KALNIŅŠ, M.: *Argiolestes spungisi* sp. nov. (Odonata: Argiolestidae) from New Guinea



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Figures 1-2. Limestone creek 10-13 km NE Waisai, Waigeo Island - the habitat of *Argiolestes australis* (Guérin-Meneville, 1830). Observed and sampled individuals were flying over and along the creek on sunny place.

Plate 56

KAZANTSEV, S.V., TELNOV, D.: A mimetic assemblage of net-winged beetles (Coleoptera: Lycidae) from West Papua


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Figures 1-6. General view and aedeagi of Metriorrhynchini, holotypes. 1-3 – *Cautires albonigrus* Kazantsev sp. nov.; 4-6 – *Cladophorus dmitryi* Kazantsev sp. nov.; 1, 4 – Habitus, dorsal view; 2-3 & 5-6 – Aedeagi [scale bar 0.5 mm].

Plate 57

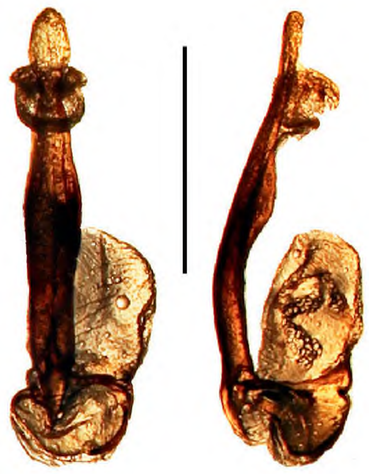
KAZANTSEV, S.V., TELNOV, D.: A mimetic assemblage of net-winged beetles (Coleoptera: Lycidae) from West Papua













Figures 1-8. General view and details of *Metrioguinus* Kazantsev gen. nov., holotypes. 1-5 – *M. kristinae* Kazantsev sp. nov.; 6-8 – *M. vikhrevi* Kazantsev sp. nov.; 1, 6 – Habitus, dorsal view; 2 – Ultimate abdominal segments, lateral view; 3 – ditto, dorsal view; 4-5 & 7-8 – Aedeagi [scale bar 0.5 mm].

Plate 58

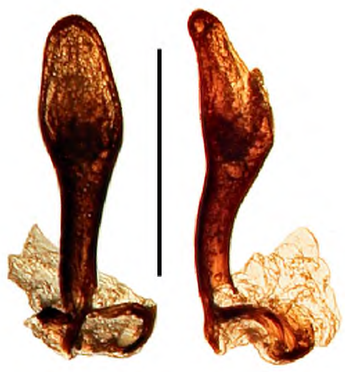
KAZANTSEV, S.V., TELNOV, D.: A mimetic assemblage of net-winged beetles (Coleoptera: Lycidae) from West Papua



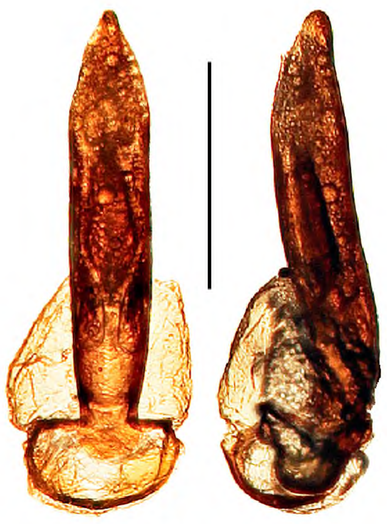
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Figures 1-6. General view and aedeagi of *Xylobanus*, holotypes. 1-3 – *Xylobanus albipennis* Kazantsev sp. nov.; 4-6 – *X. mauroleucus* Kazantsev sp. nov.; 1, 4 – Habitus, dorsal view; 2-3 & 5-6 – Aedeagi [scale bar 0.5 mm].

Plate 59

KAZANTSEV, S.V., TELNOV, D.: A mimetic assemblage of net-winged beetles (Coleoptera: Lycidae) from West Papua



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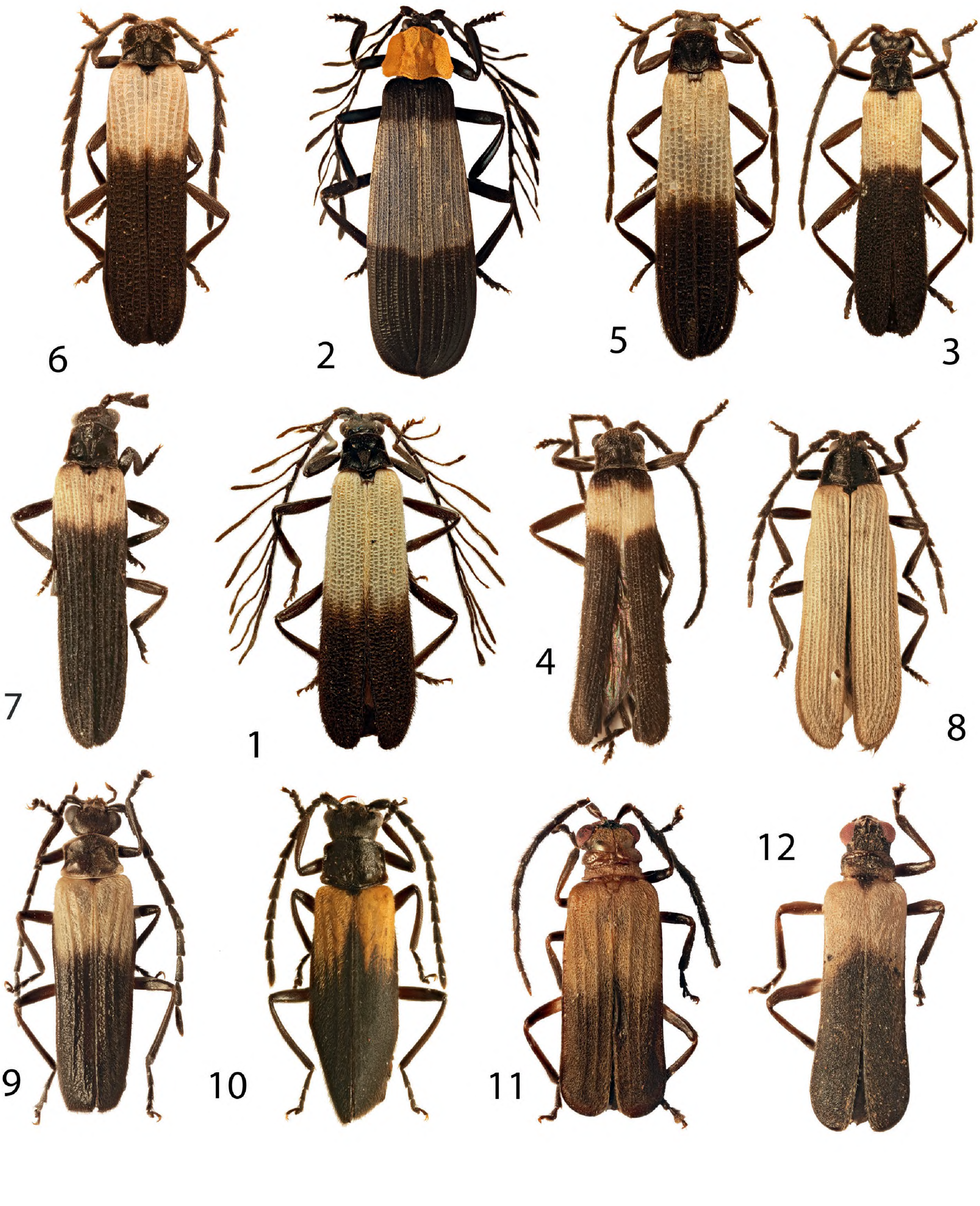


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Figures 1-4. General view and aedeagi of Lycidae, holotypes. 1-3 – *Porrostoma arfakense* Kazantsev sp. nov.; 4 – *Plateros candidus* Kazantsev sp. nov.; 1, 4 – Habitus, dorsal view; 2-3 – Aedeagi [scale bar 0.5 mm].

Plate 60

KAZANTSEV, S.V., TELNOV, D.: A mimetic assemblage of net-winged beetles (Coleoptera: Lycidae) from West Papua



Figures 1-12. General view of mymetic Papuan Lycidae, Cantharidae and Chrysomelidae. 1 – *Cautires albonigrus* Kazantsev sp. nov.; 2 – *Cladophorus dmitryi* Kazantsev sp. nov.; 3 – *Metrioguinus kristinae* Kazantsev sp. nov., sp. nov.; 4 – *M. vikhrevi* Kazantsev sp. nov.; 5 – *Xylobanus albipennis* Kazantsev sp. nov.; 6 – *X. mauroleucus* Kazantsev sp. nov.; 7 – *Porrostoma arfakense* Kazantsev sp. nov.; 8 – *Plateros candidus* Kazantsev sp. nov.; 9 – Cantharidae Silinae, gen. sp. 1; 10 – Cantharidae Silinae, gen. sp. 2; 11 – Chrysomelidae, gen. sp. 1; 12 – Chrysomelidae, gen. sp. 2.

Plate 61

KAZANTSEV, S.V., TELNOV, D.: A mimetic assemblage of net-winged beetles (Coleoptera: Lycidae) from West Papua



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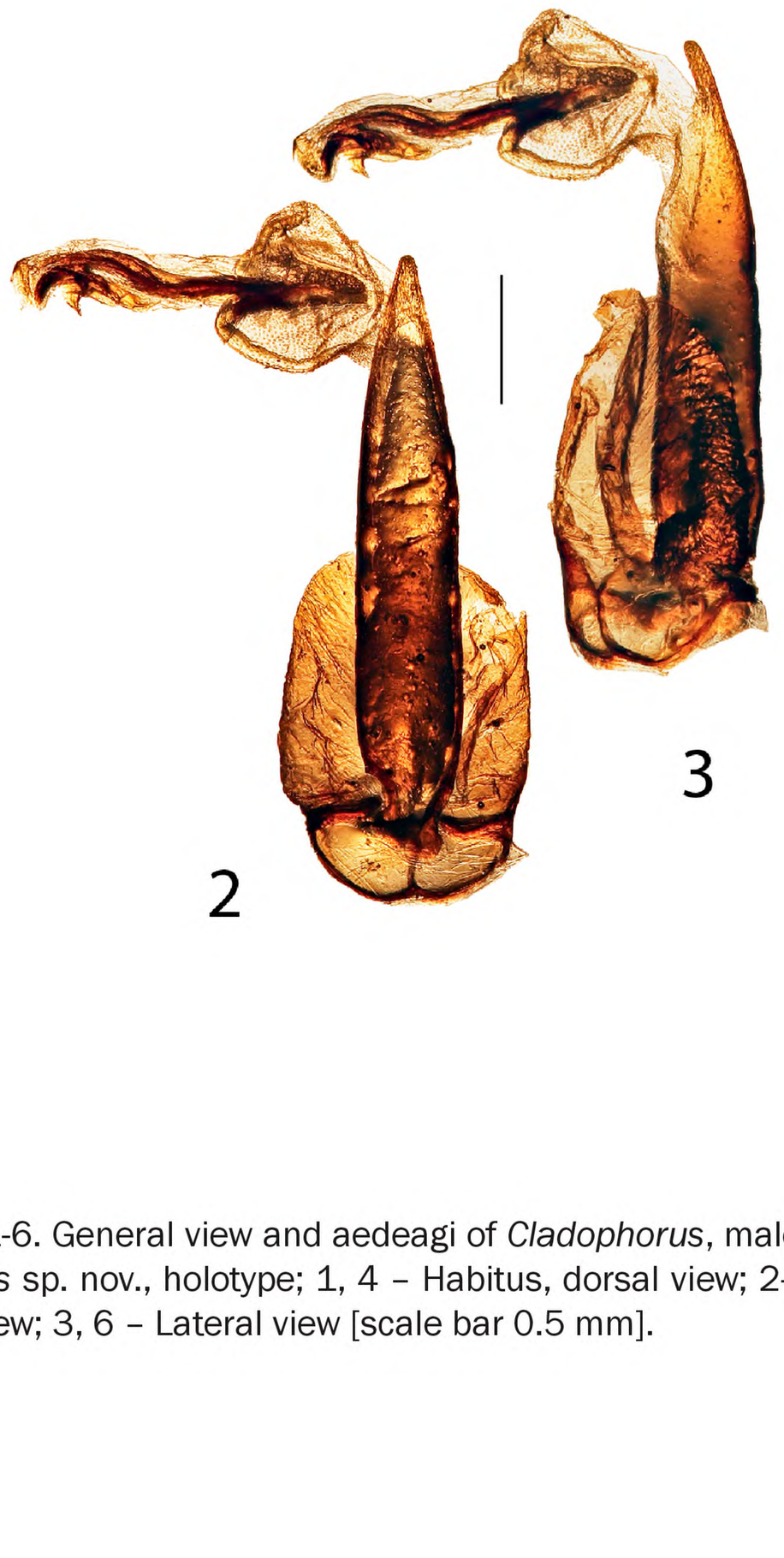
Figures 1-2. Mid-montane fainforest (1) and biotope at sampling place (2) in the Arfak Mountains in Doberai Peninsula, West New Guinea, near Lake Gigi, Anggi lakes at ca. 2000-2500 meters above sea level (photos: D.Telnov, 2015).

Plate 62

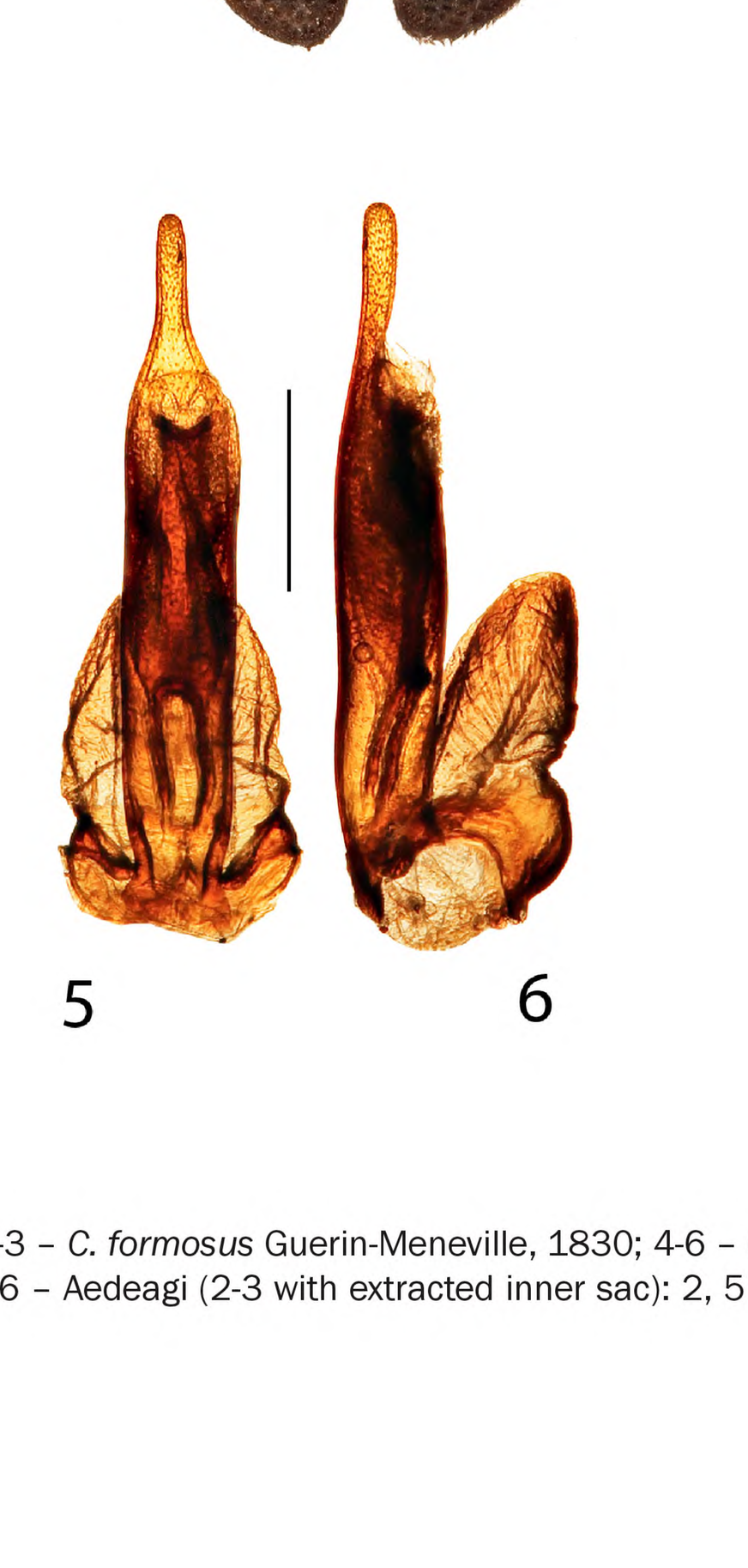
KAZANTSEV, S.V., TELNOV, D.: A mimetic assemblage of net-winged beetles (Coleoptera: Lycidae) from West Papua



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Figures 1-6. General view and aedeagi of *Cladophorus*, males. 1-3 – *C. formosus* Guerin-Meneville, 1830; 4-6 – *C. avicollaris* sp. nov., holotype; 1, 4 – Habitus, dorsal view; 2-3, 5-6 – Aedeagi (2-3 with extracted inner sac): 2, 5 – Dorsal view; 3, 6 – Lateral view [scale bar 0.5 mm].

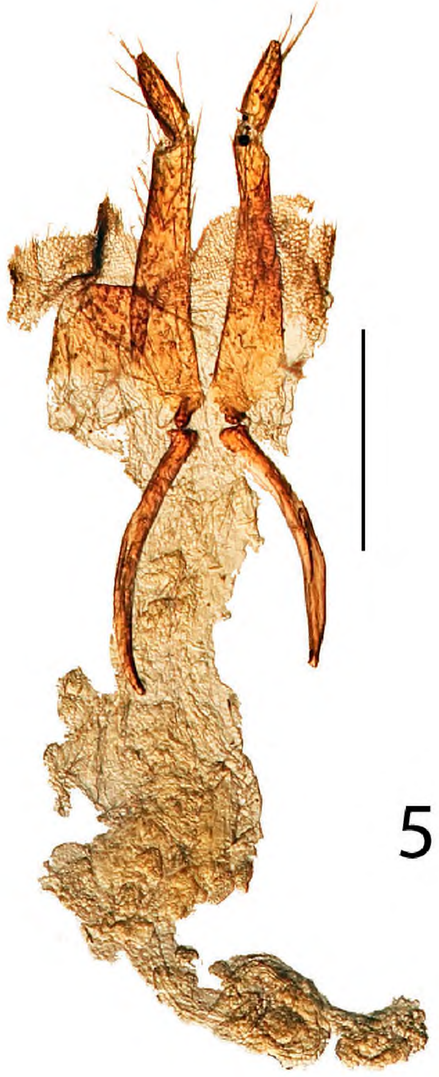
Plate 63

KAZANTSEV, S.V., TELNOV, D.: A mimetic assemblage of net-winged beetles (Coleoptera: Lycidae) from West Papua





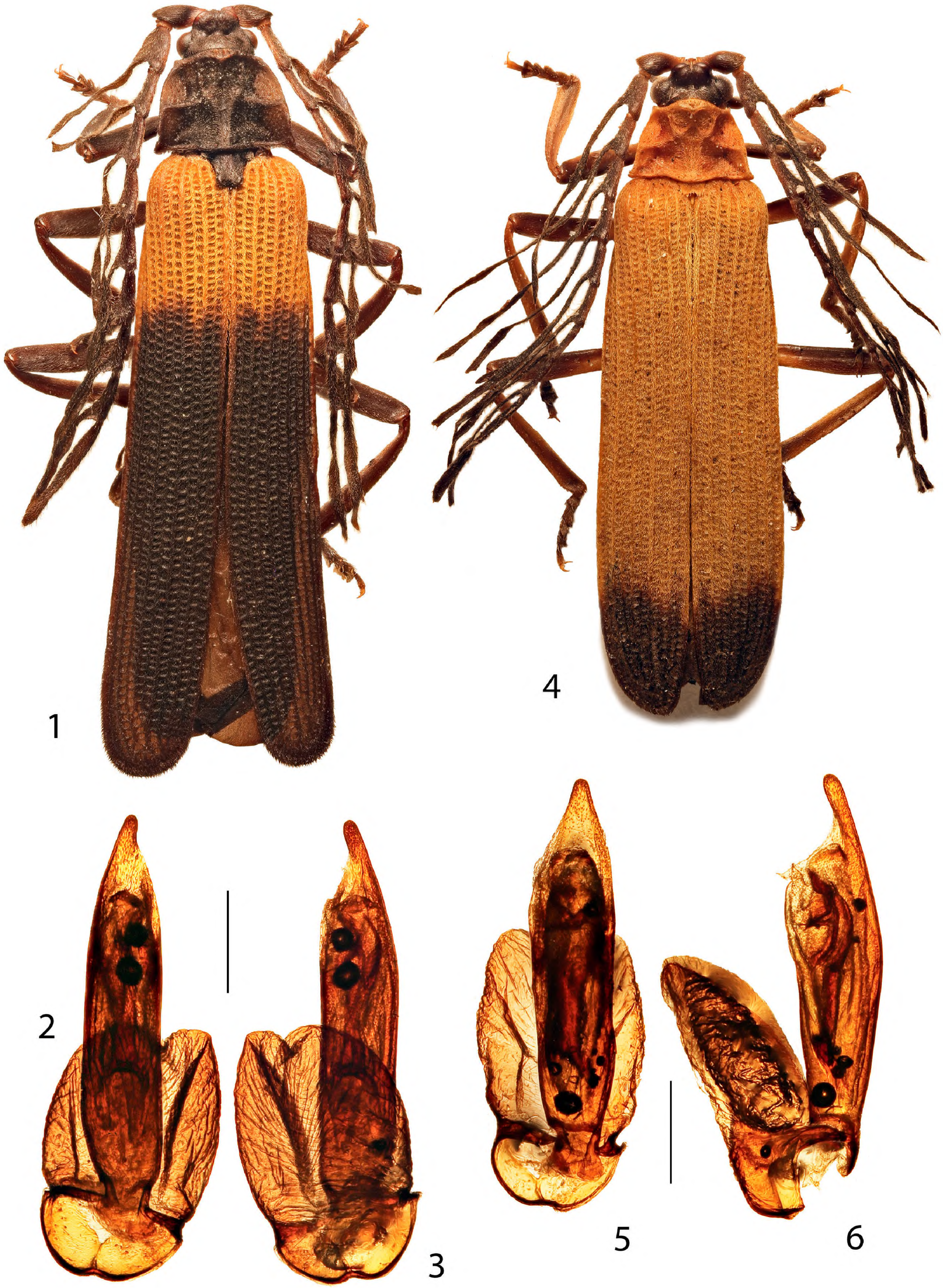




Figures 1-5. General view and details of *Cladophorus*, holotypes. 1-3 – *C. bupuensis* sp. nov., ♂; 4-5 – *C. flavoscutellatus* sp. nov., ♀; 1, 4 – Habitus, dorsal view; 2-3 – Aedeagi: 5 – ♀ genitalia; 2, 5 – Dorsal view; 3 – Lateral view [scale bar 0.5 mm].

Plate 64

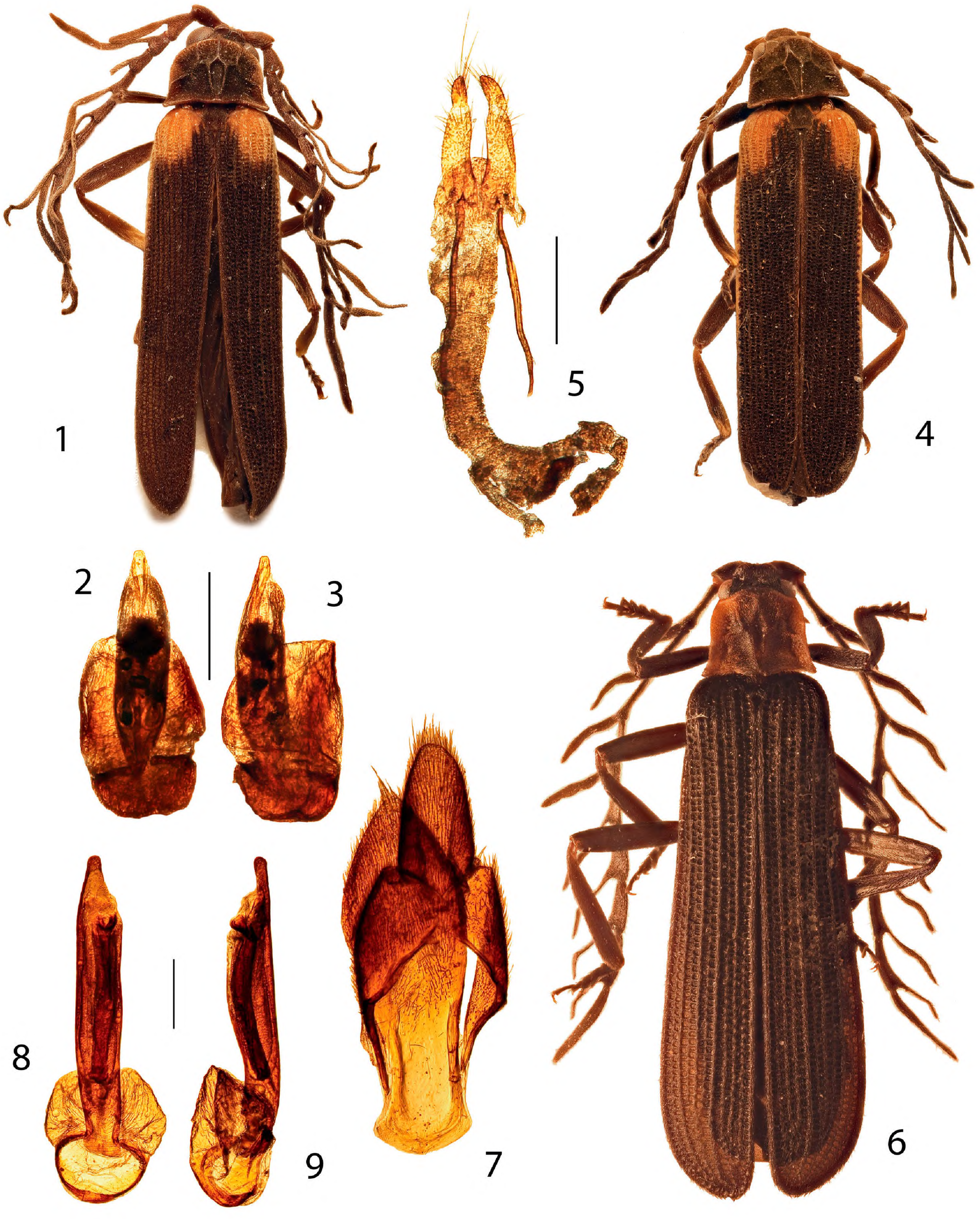
KAZANTSEV, S.V., TELNOV, D.: A mimetic assemblage of net-winged beetles (Coleoptera: Lycidae) from West Papua



Figures 1-6. General view and aedeagi of *Cladophorus*, holotypes ♂♂. 1-3 – *C. grekeae* sp. nov.; 4-6 – *C. holynskii* sp. nov.; 1, 4 – Habitus, dorsal view; 2-3, 5-6 – Aedeagi: 2, 5 – Dorsal view; 3, 6 – Lateral view [scale bar 0.5 mm].

Plate 65

KAZANTSEV, S.V., TELNOV, D.: A mimetic assemblage of net-winged beetles (Coleoptera: Lycidae) from West Papua



Figures 1-9. Habitus, dorsal view and details of *Cladophorus*. 1-5 – *C. humeralissimus* sp. nov.; 6-9 – *C. lacrimosus* sp. nov.; 1, 4, 6 – Habitus, dorsal view; 7 – Ultimate ventrites; 2-3, 8-9 – Aedeagus; 5 – ♀ genitalia; 1-3, 6-9 – Holotypes ♂♂; 4-5 – Paratype ♀; 2, 5, 8 – Dorsal view; 3, 9 – Lateral view [scale bar 0.5 mm].

Plate 66

KAZANTSEV, S.V., TELNOV, D.: A mimetic assemblage of net-winged beetles (Coleoptera: Lycidae) from West Papua


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Figures 1-6. Habitus, dorsal view and aedeagi of *Cladophorus*, holotypes ♂♂. 1-3 – *C. maurokitrinus* sp. nov.; 4-6 – *C. maurus* sp. nov.; 1, 4 – Habitus, dorsal view; 2-3, 5-6 –Aedeagi: 2, 4 – Dorsal view; 3, 6 – Lateral view [scale bar 0.5 mm].

Plate 67

KAZANTSEV, S.V., TELNOV, D.: A mimetic assemblage of net-winged beetles (Coleoptera: Lycidae) from West Papua



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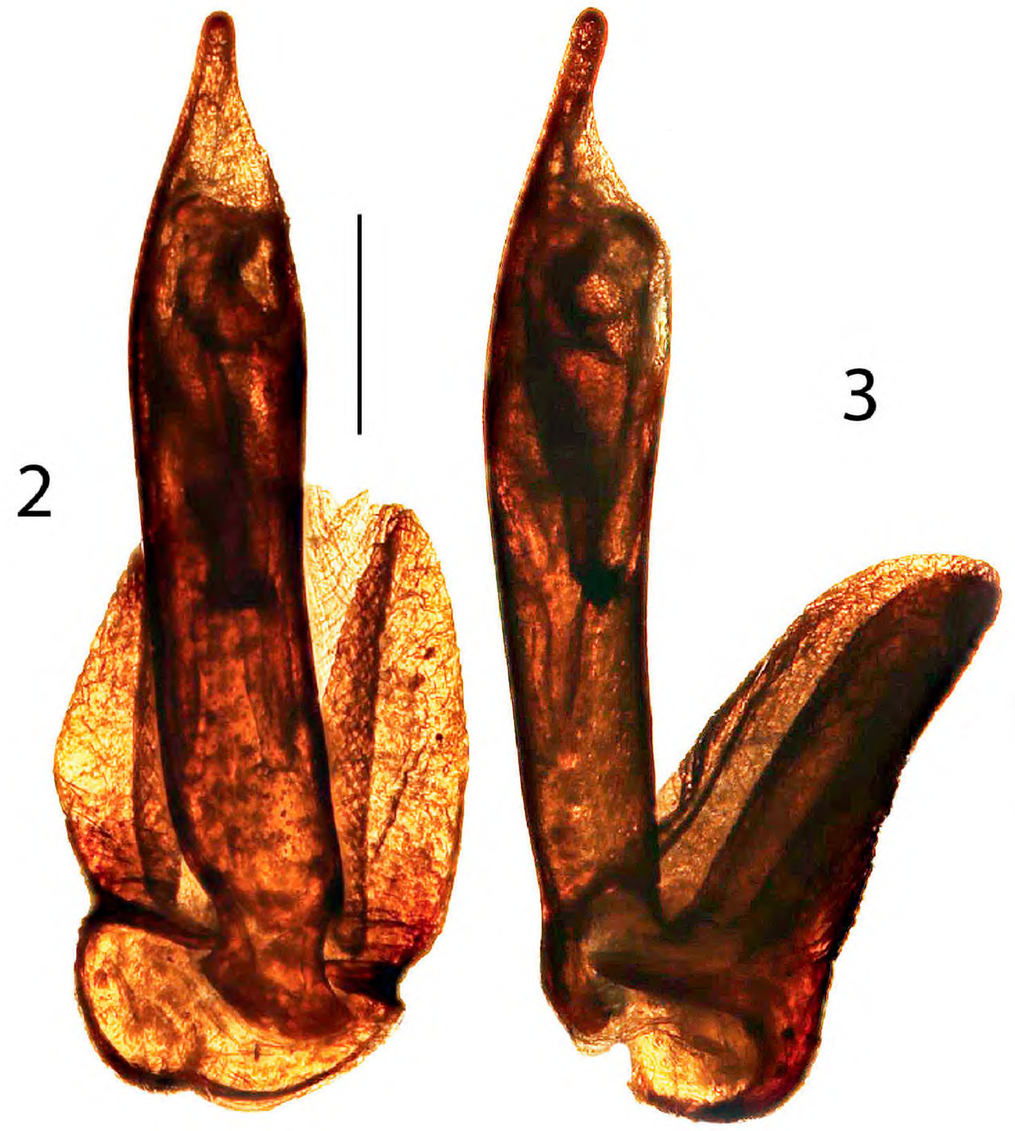
Figures 1-6. Habitus, dorsal view and aedeagi of *Cladophorus*, holotypes ♂♂. 1-3 – *C. nabirensis* sp. nov.; 4-6 – *C. nimbus* sp. nov.; 1, 4 – Habitus, dorsal view; 2-3, 5-6 – Aedeagi: 2, 5 – Dorsal view; 3, 6 – Lateral view [scale bar 0.5 mm].

Plate 68

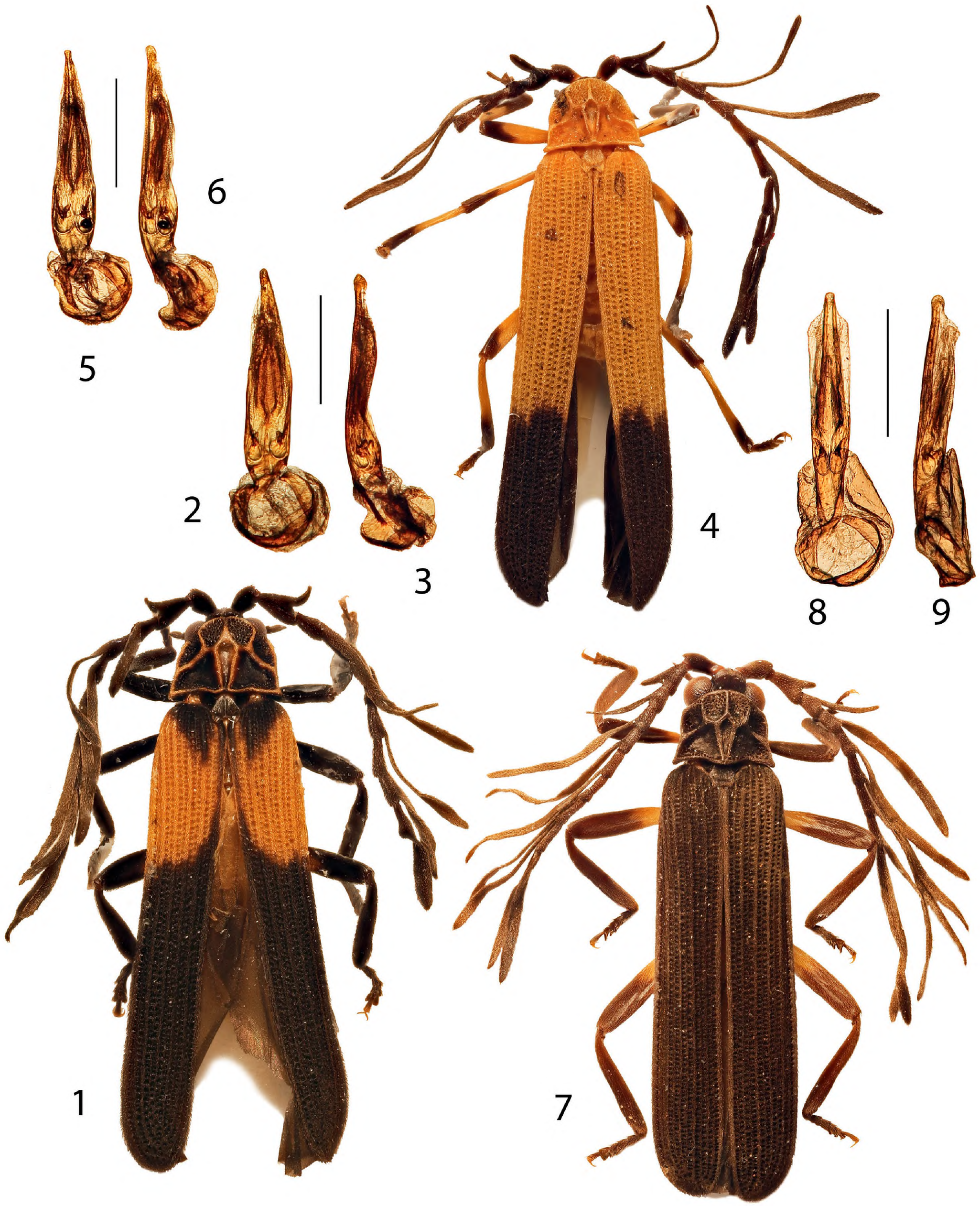
KAZANTSEV, S.V., TELNOV, D.: A mimetic assemblage of net-winged beetles (Coleoptera: Lycidae) from West Papua



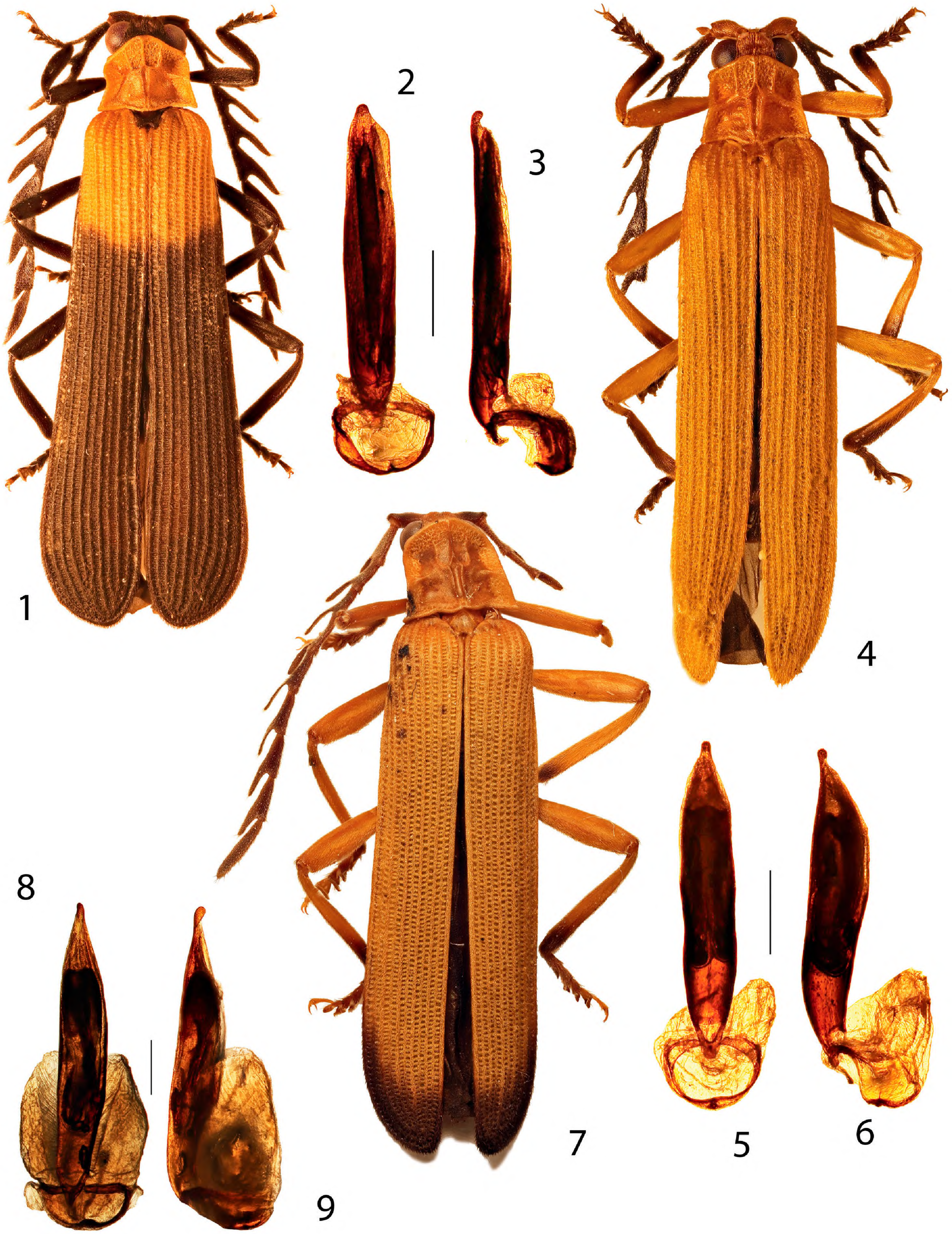




Figures 1-6. Habitus, dorsal view and aedeagi of *Cladophorus*, holotypes ♂♂. 1-3 – *C. telnovi* sp. nov.; 4-6 – *C. weigeli* sp. nov.; 1, 4 – Habitus, dorsal view; 2-3, 5-6 – Aedeagi: 2, 5 – Dorsal view; 3, 6 – Lateral view [scale bar 0.5 mm].



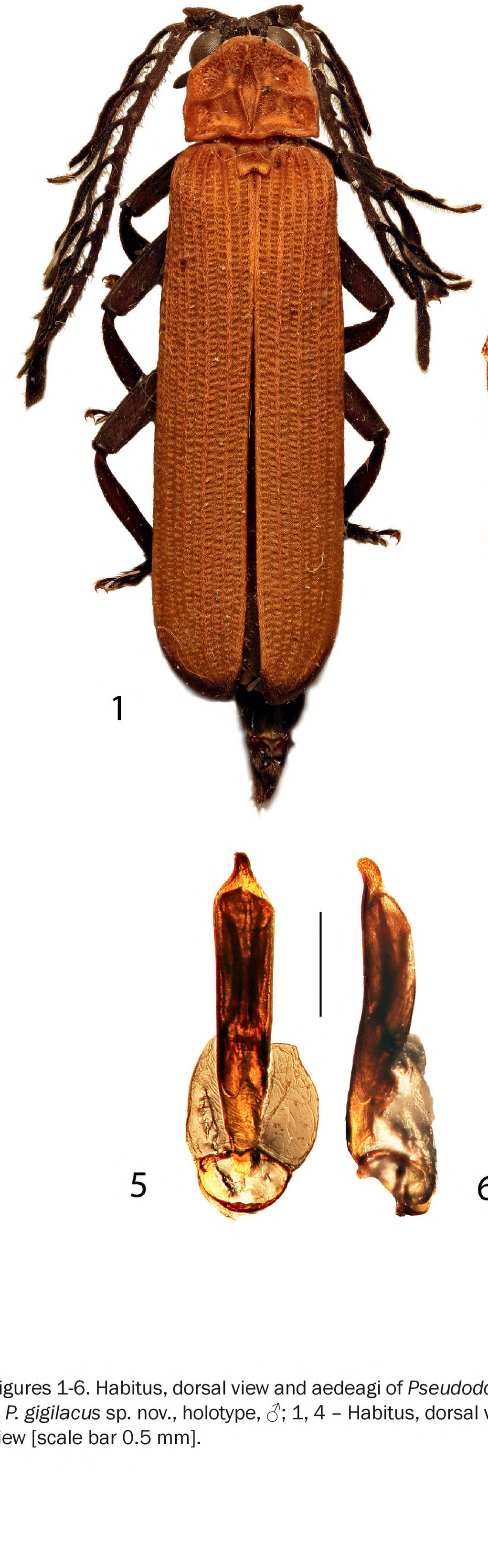
Figures 1-9. Habitus, dorsal view and aedeagi of *Cladophorus*, holotypes ♂♂. 1-3 – *C. halmaheraensis* sp. nov.; 4-6 – *C. obiensis* sp. nov.; 7-9 – *C. carbonipennis* sp. nov.; 1, 4, 7 – Habitus, dorsal view; 2-3, 5-6, 7-8 – Aedeagi: 2, 5, 8 – Dorsal view; 3, 6, 9 – Lateral view [scale bar 0.5 mm].



Figures 1-9. Habitus, dorsal view and aedeagi of *Cladophorus*, holotypes ♂♂. 1-3 – *C. tertius* sp. nov.; 4-6 – *C. anggiensis* sp. nov.; 7-9 – *C. pusspenssatensis* sp. nov.; 1, 4, 7 – Habitus, dorsal view; 2-3, 5-6, 8-9 – Aedeagi: 2, 5, 8 – dorsal view; 3, 6, 9 – Lateral view [scale bar 0.5 mm].

Plate 71

KAZANTSEV, S.V., TELNOV, D.: A mimetic assemblage of net-winged beetles (Coleoptera: Lycidae) from West Papua



Figures 1-6. Habitus, dorsal view and aedeagi of *Pseudodontocerus*, ♂♂. 1-3 – *P. fuscatus* (Waterhouse, 1879); 4-6 – *P. gigilacus* sp. nov., holotype, ♂; 1, 4 – Habitus, dorsal view; 2-3, 5-6 – Aedeagi: 2, 5 – Dorsal view; 3, 6 – Lateral view [scale bar 0.5 mm].

Plate 72

KAZANTSEV, S.V., TELNOV, D.: A mimetic assemblage of net-winged beetles (Coleoptera: Lycidae) from West Papua

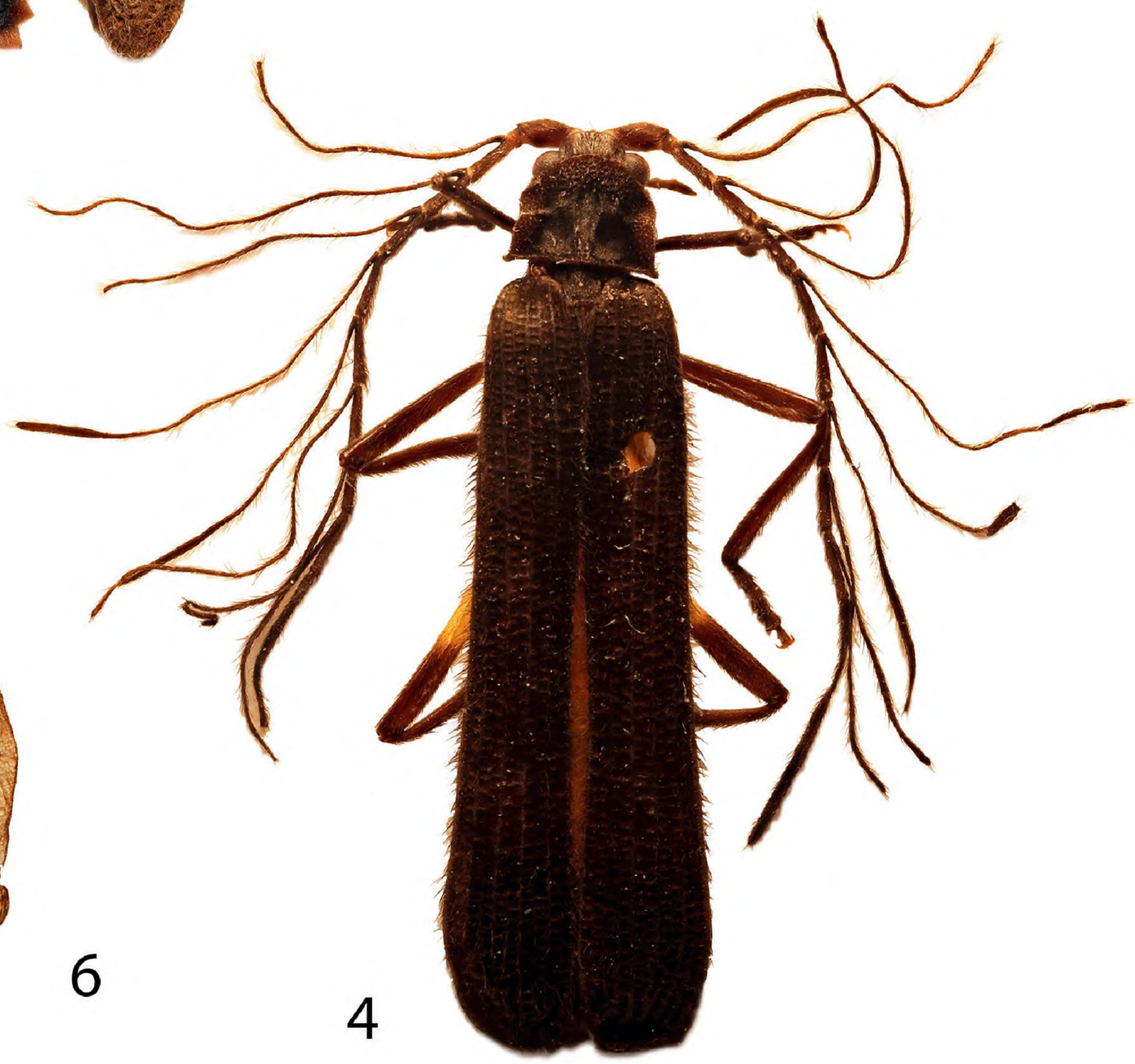


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Figures 1-6. Habitus, dorsal view and aedeagi of *Pseudodontocerus*, holotypes ♂♂. 1-3 – *P. hilaris* sp. nov.; 4-6 – *P. incultus* sp. nov.; 1, 4 – Habitus, dorsal view; 2-3, 5-6 – Aedeagi: 2, 5 – Dorsal view; 3, 6 – Lateral view [scale bar 0.5 mm].

Plate 73

KAZANTSEV, S.V., TELNOV, D.: A mimetic assemblage of net-winged beetles (Coleoptera: Lycidae) from West Papua



Figures 1-10. Habitus, dorsal view and details of *Pseudodontocerus*, holotypes ♂♂. 1-3 – *P. maculihumeralis* sp. nov.; 4-6 – *P. variicornis* sp. nov.; 7-10 – *P. villosus* sp. nov.; 1, 4, 7 – Habitus, dorsal view; 8 – Anterior part of body; 2-3, 5-6, 9-10 – Aedeagi: 2, 5, 8-9 – Dorsal view; 3, 6, 10 – Lateral view [scale bar 0.5 mm].



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Figures 1-10. Habitus, dorsal view and details of *Cautires*, holotypes. 1-3 – *C. brunneus* sp. nov.; 4-6 – *C. dituaoides* sp. nov.; 7-10 – *C. eniclasoides* sp. nov.; 1, 4, 7 – Habitus, dorsal view; 8 – Pronotum; 2-3, 5-6 – Aedeagi: 1-6 – ♂♂; 7-9 – ♀; 2, 5, 8-9 – Dorsal view; 3, 6 – Lateral view; 9 – ♀ genitalia [scale bar 0.5 mm].

Plate 75

KAZANTSEV, S.V., TELNOV, D.: A mimetic assemblage of net-winged beetles (Coleoptera: Lycidae) from West Papua















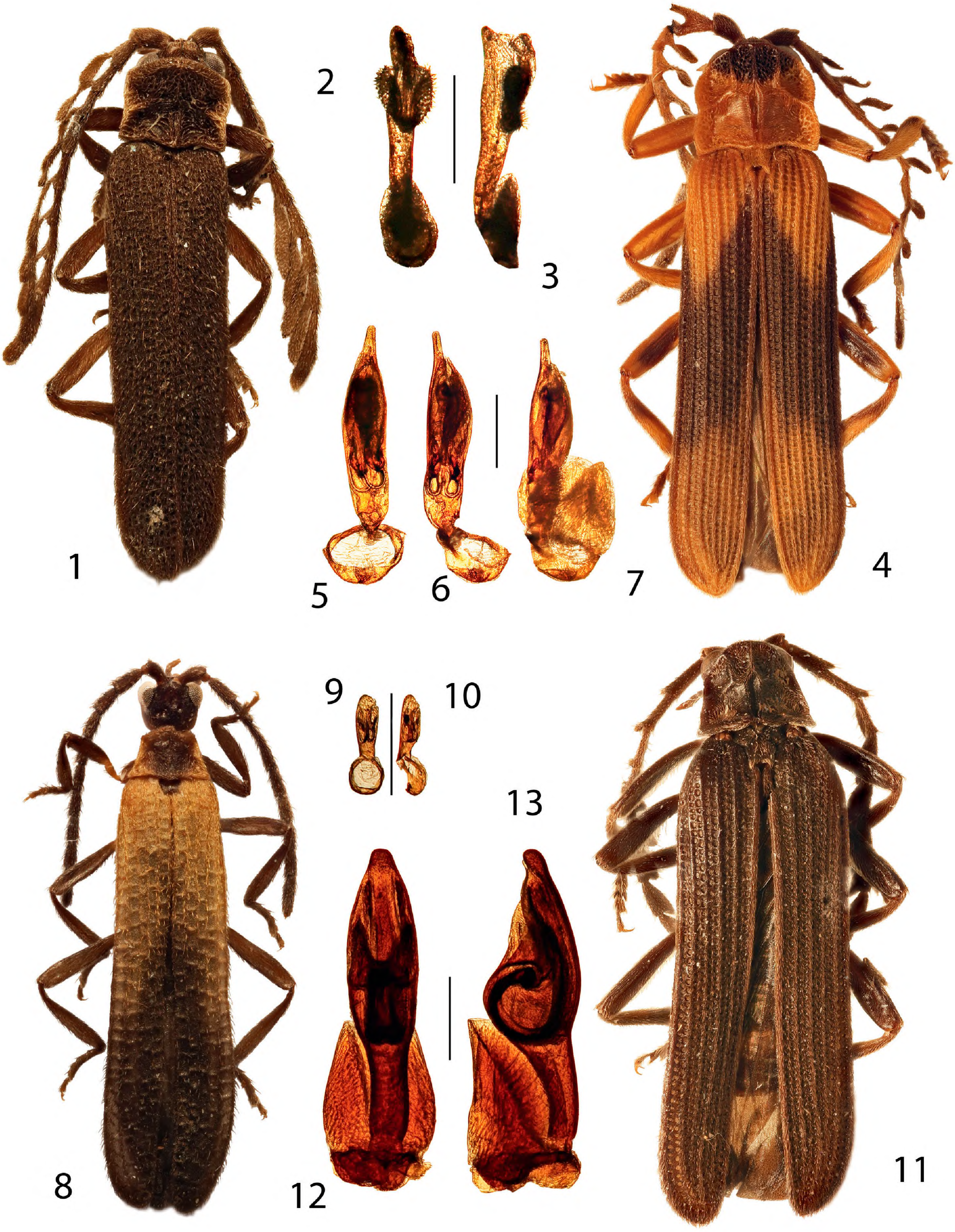




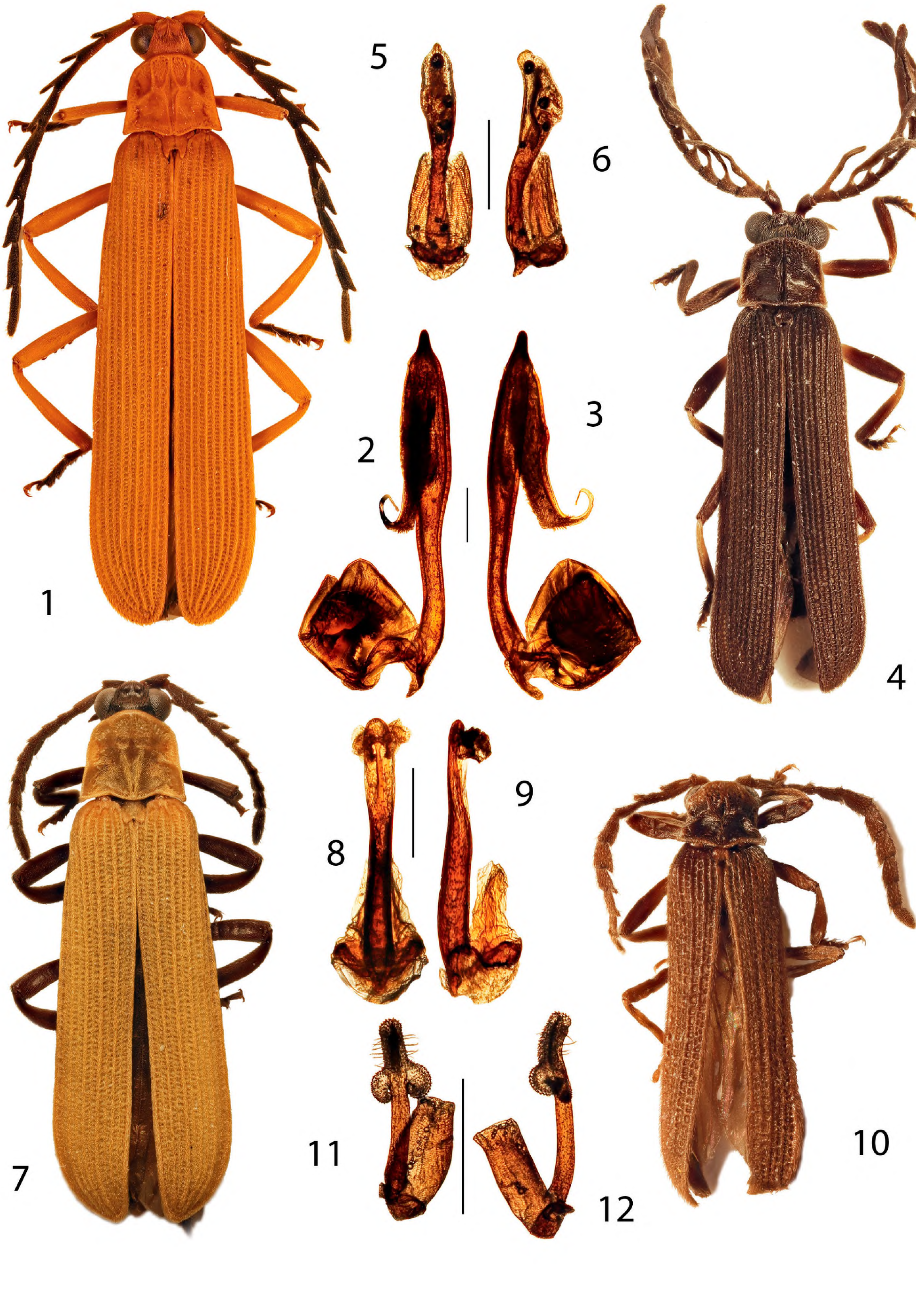
Figures 1-13. Habitus, dorsal view and details of *Cautires*, ♂♂. 1-4 – *C. extraneus* sp. nov.; 5-7 – *C. ignotus* sp. nov.; 8-10 – *C. maturnus* Kleine; 11-13 – *C. miklukhomaklaii* sp. nov.; 1, 5, 8, 11 – Habitus, dorsal view; 2 – Ultimate ventrites; 3-4, 6-7, 9-10, 12-13 – Aedeagi: 1-7, 11-13 – Holotypes; 3, 6, 9, 12 – Dorsal view; 2, 4, 7, 10, 13 – Lateral view [scale bar 0.5 mm].

Plate 76

KAZANTSEV, S.V., TELNOV, D.: A mimetic assemblage of net-winged beetles (Coleoptera: Lycidae) from West Papua

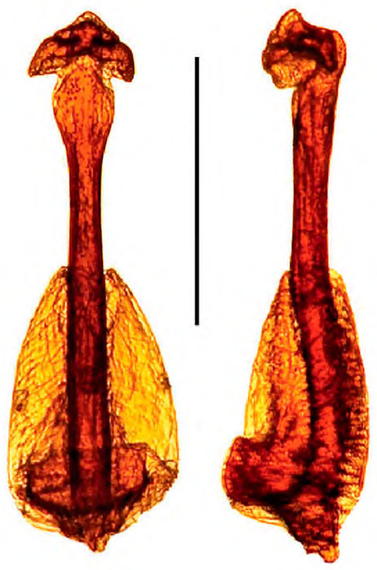


Figures 1-13. Habitus, dorsal view and aedeagi of *Cautires*, *Malacolycus* and *Metriorrhynchus*, holotypes ♂♂. 1-3 – *C. picipennis* sp. nov.; 4-7 – *C. tricoloripennis* sp. nov.; 8-10 – *Malacolycus gigiensis* sp. nov.; 11-13 – *Metriorrhynchus cochleiformis* sp. nov.; 1, 4, 8, 11 – Habitus, dorsal view; 2-3, 5-7, 9-10, 12-13 – Aedeagi: 5-6 – With removed phallobasal membrane; 2, 5, 9, 12 – Dorsal view; 3, 6-7, 10, 13 – Lateral view [scale bar 0.5 mm].



Figures 1-12. Habitus, dorsal view and aedeagi of *Metriorrhynchus* and *Porrostoma*, holotypes ♂♂. 1-3 – *M. uperensis* sp. nov.; 4-6 – *M. vitiosus* sp. nov.; 7-9 – *P. cautiromimum* sp. nov.; 10-12 – *P. exile* sp. nov.; 1, 4, 7, 10 – Habitus, dorsal view; 2-3, 5-6, 8-9, 11-12 – Aedeagi: 2, 5, 8, 11 – Dorsal view; 3, 6, 9, 12 – Lateral view [scale bar 0.5 mm].















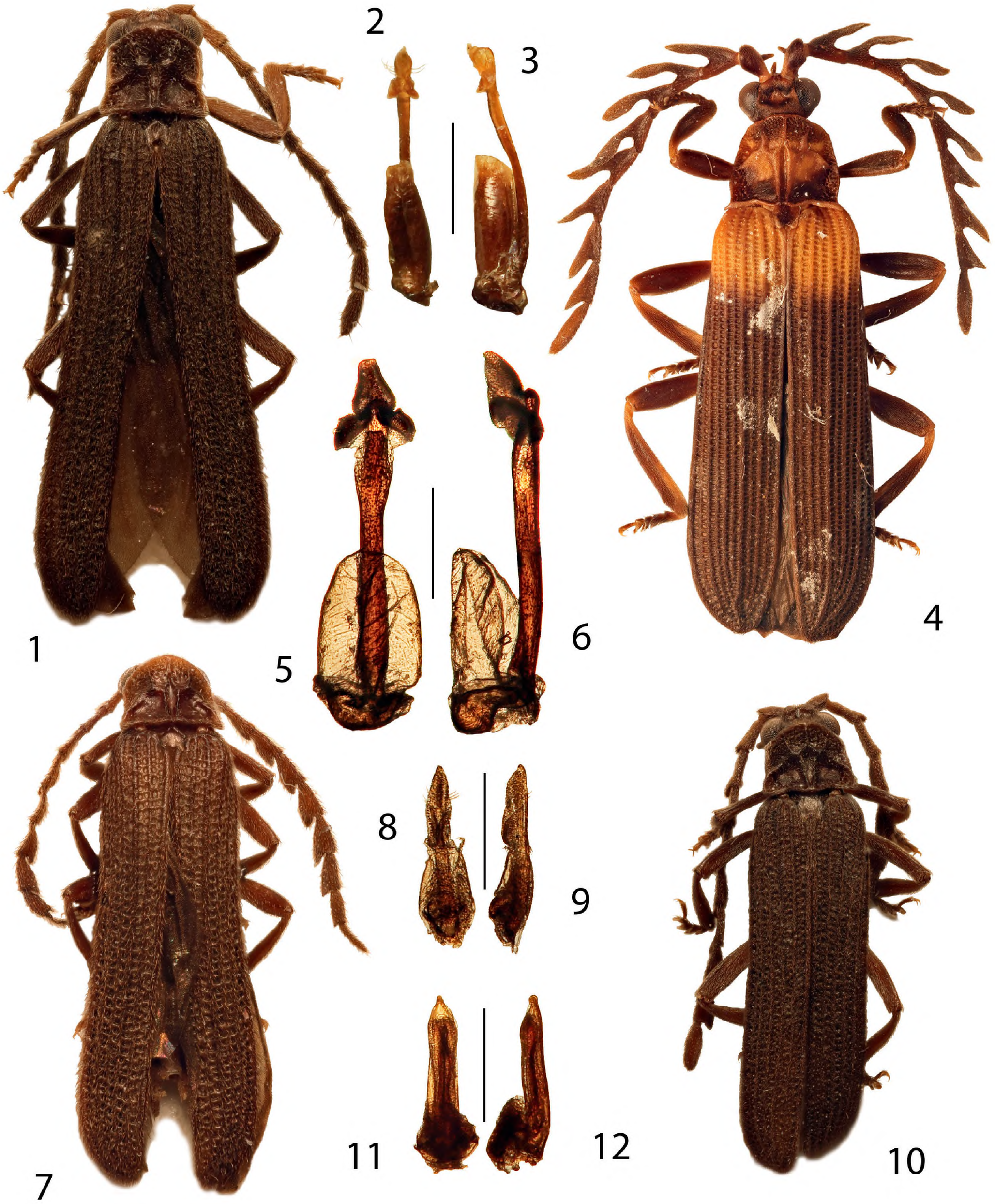




Figures 1-11. Habitus, dorsal view and details of *Porrostoma*, holotypes ♂♂. 1-3 – *P. fuscum* sp. nov.; 4-8 – *P. gigivagum* sp. nov.; 9-11 – *P. mutum* sp. nov.; 1, 4, 9 – Habitus, dorsal view; 5-6– Ultimate ventrites; 2-3, 7-8, 10-11 – Aedeagi: 2, 6-7, 10 – Dorsal view; 3, 5, 8, 11 – Lateral view [scale bar 0.5 mm].

Plate 79

KAZANTSEV, S.V., TELNOV, D.: A mimetic assemblage of net-winged beetles (Coleoptera: Lycidae) from West Papua



Figures 1-12. Habitus, dorsal view and aedeagi of *Porrostoma* and *Procautires*, holotypes ♂♂. 1-3 – *Porrostoma mystax* sp. nov.; 4-6 – *Porrostoma semiflavum* sp. nov.; 7-9 – *Procautires cirratus* sp. nov.; 10-12 – *Procautires fuscicolor* sp. nov.; 1, 4, 7, 10 – Habitus, dorsal view; 2-3, 5-6, 8-9, 11-12 – Aedeagi: 2, 5, 8, 11 – Dorsal view; 3, 6, 9, 12 – Lateral view [scale bar 0.5 mm].



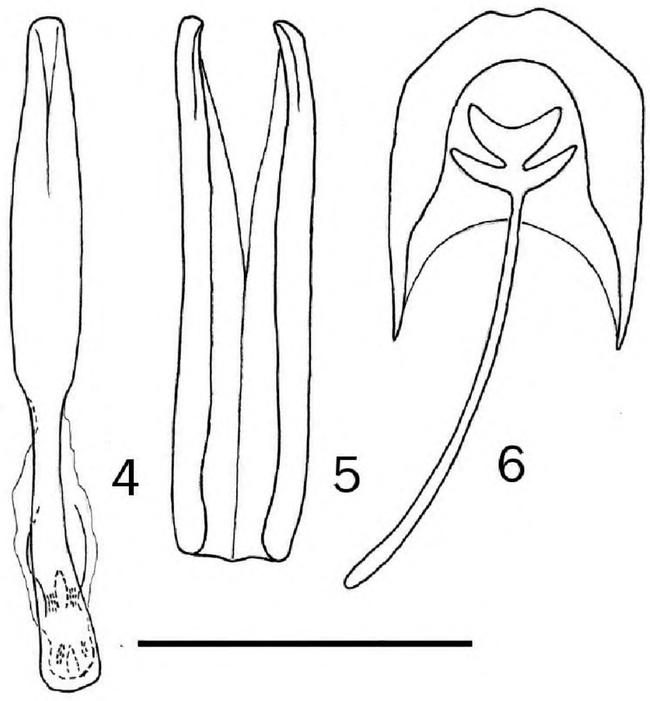
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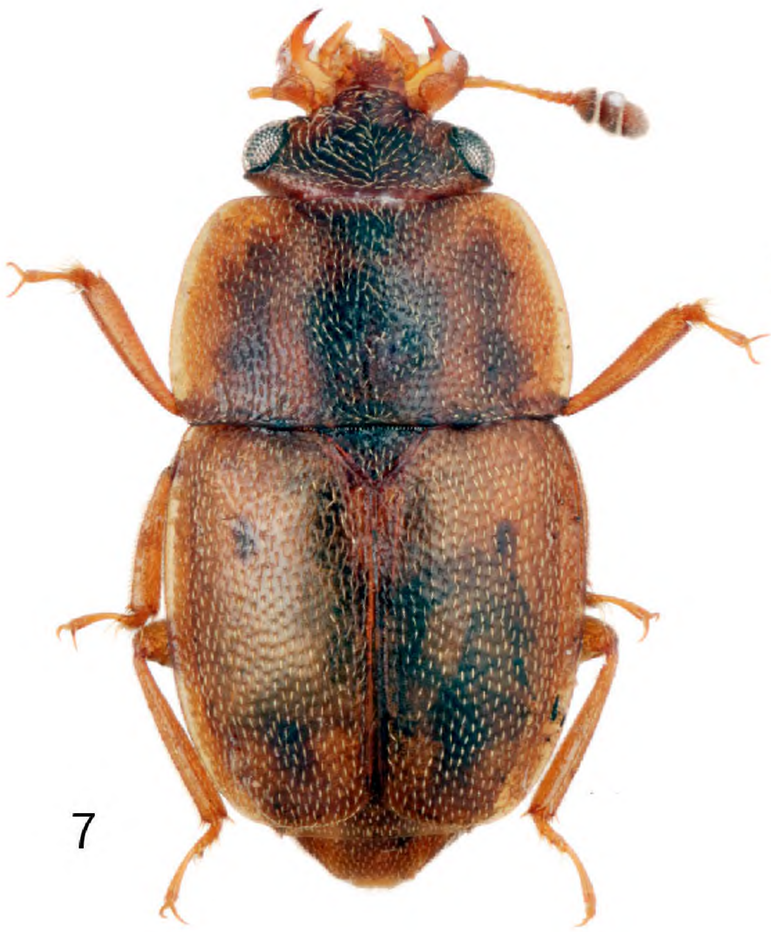
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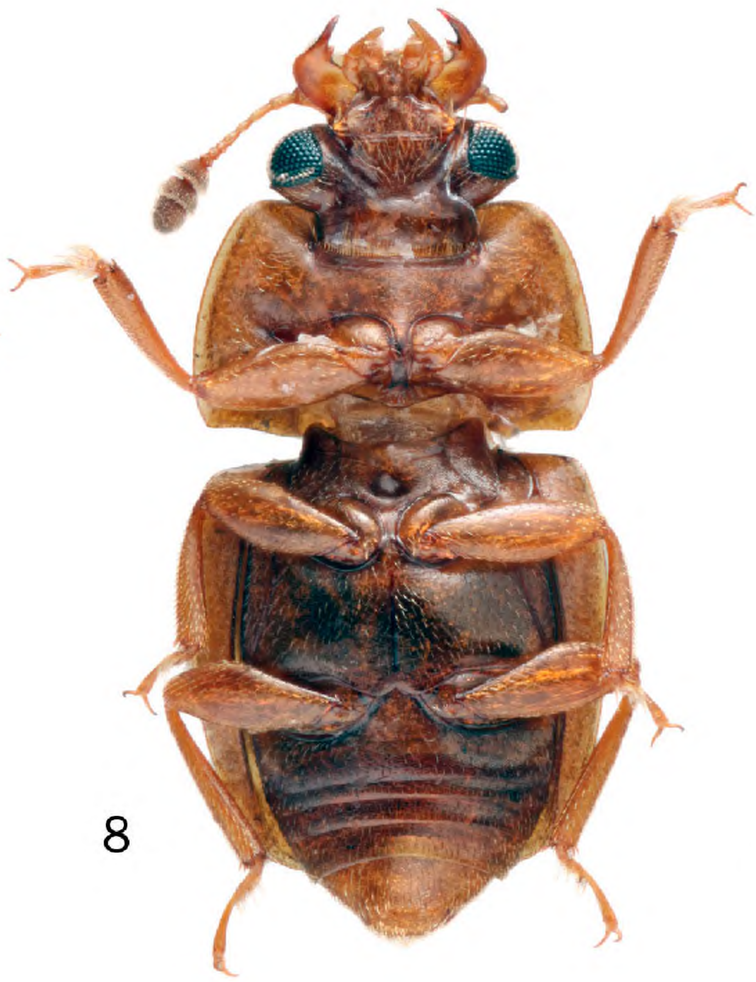
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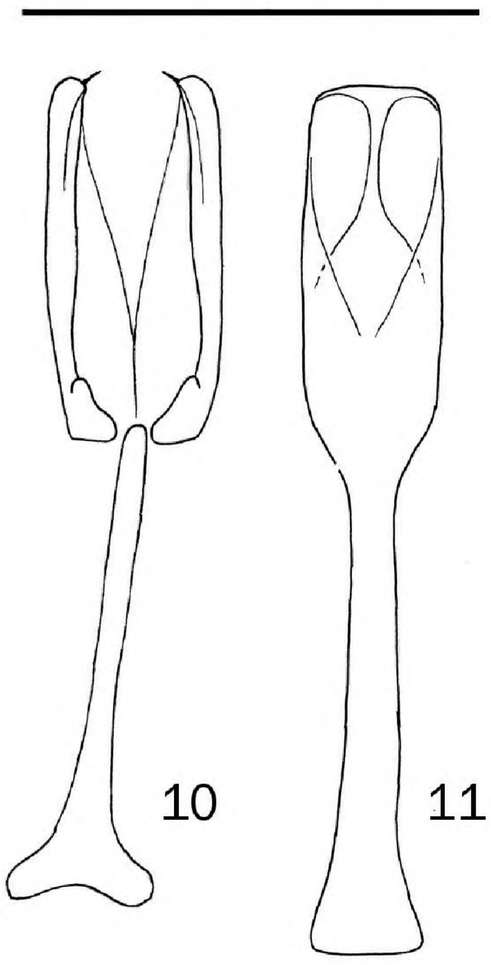
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Figures 1-11. Papuan Epuraeinae. 1-6 – *Epuraea (Haptoncus) telnovi* sp. nov.: 1 – Holotype ♂, habitus, dorsal view [body length 3.7 mm]; 2-3 – Paratype ♀ [body length 2.9 mm]: 2 – Dorsal view; 3 – Ventral view; 4 – Penis (penis trunk with basal apodeme and armature of inner sac), dorsal view; 5 – Tegmen, ventral view; 6 – Genital capsule (anal sclerite, ventral plate and spiculum gastrale), ventral view; 7-11 – *Amystrops (Amystrops) solitaria* sp. nov., holotype ♂: 7 – Habitus, dorsal view [body length 2.8 mm]; 8 – ditto, ventral view; 9 – Head, ventral view; 10 – Tegmen, ventral view; 11 – Penis, dorsal view [scale bars to figs 4-6 & 10-11 0.5 mm].



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Figures 1-7. Papuan Epuraeinae. 1-3 – *Trimenus* (*Schawalleria* subgen. nov.) *plicatus* sp. nov., paratypes, ♂♂: 1 – Habitus, dorsal view; 2 – ditto, ventral view; 3 – Head, ventral view [body length 6 mm]; 4-7 – *Carpocryraea gratiosa* sp. nov.: 4 – Holotype ♂, habitus, dorsal view [body length 3.7 mm]; 5 – ditto, ventral view; 6 – Paratype ♂, habitus, ventral view [body length 2.9 mm]; 7 – Head, ventral view.



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Figures 1-2. *Scaphisoma telnovi* sp. nov., holotype ♀. 1 – Habitus, dorsal view; 2 –ditto, lateral view [scale bar 1 mm].

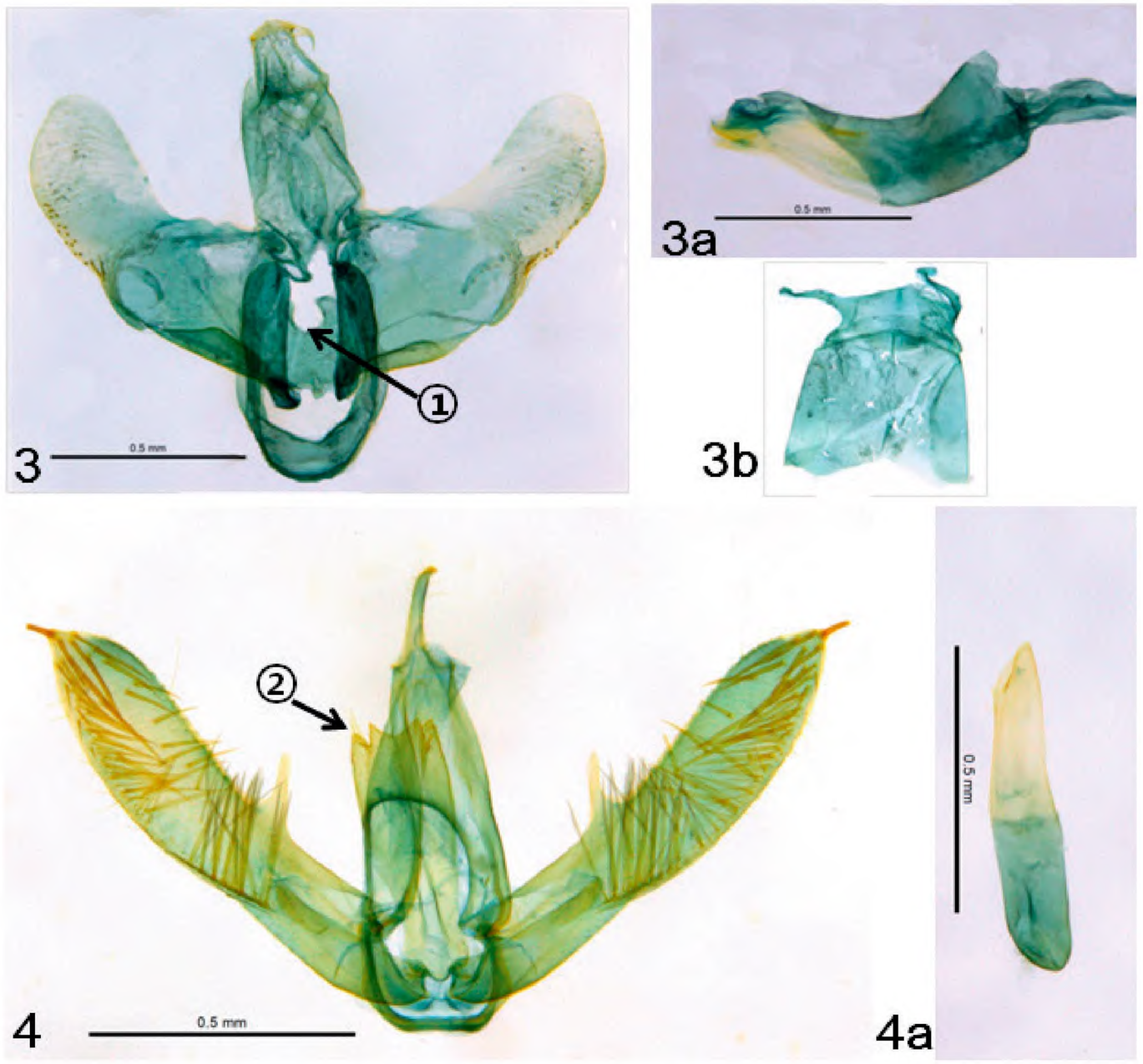
Plate 83

MEDVEDEV, L.N.: New leaf beetles (Coleoptera: Chrysomelidae) from New Guinea



Figures 1-15. New Papuan Chrysomelidae, habitus, dorsal view. 1 – *Coenobius telnovi* sp. nov., holotype; 2 – *Bucharis rufus* sp. nov., holotype; 3 – *Stethotes telnovi* sp. nov., holotype; 4 – *Phainodina strigicollis* sp. nov., holotype; 5 – *P. thoracica* sp. nov., holotype; 6 – *Pyrrhalta telnovi* sp. nov., holotype; 7 – *Anoides fulvoniger* sp. nov., holotype; 8 – *A. ornata* sp. nov., holotype; 9 – *A. nigricollis* sp. nov., holotype; 10 – *Xenidea hartmanni* sp. nov., holotype; 11 – *Manobia insulana* sp. nov., holotype; 12 – *M. viridiaenea* sp. nov., paratype; 13 – *Sutrea fasciata* sp. nov., holotype; 14 – *S. trimaculata* sp. nov., paratype; 15 – *Trachyaphthona (Longitarsella) cyanipennis* sp. nov., holotype.

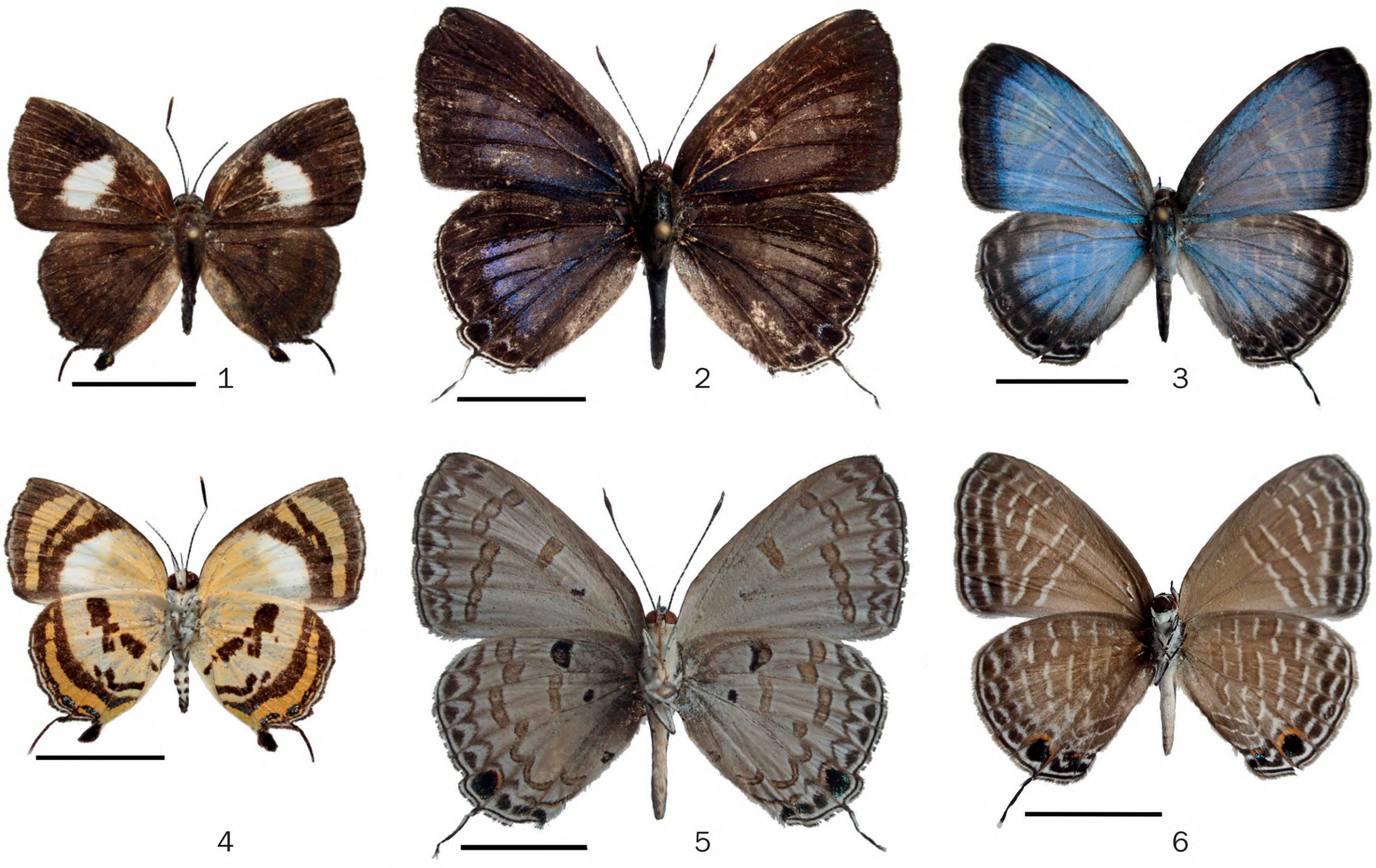




Figures 1-4. New Papuan Lecithoceridae species, adults. 1 – *Lecithocera breiensis* sp. nov., holotype ♂, dorsal view; 1a – ditto, labels; 1b – ditto, labial palpus; 2 – *Aprosoesta laminella* sp. nov., holotype ♂, dorsal view; 2a – ditto, labels; 2b – ditto, labial palpus; 3 – *Lecithocera breiensis* sp. nov., ♂ genitalia, slide No CIS- 5922/Park; 3a – ditto, phallus; 3b – ditto, abdominal segment VIII; 4 – *Aprosoesta laminella* sp. nov., ♂ genitalia, slide No CIS-5923; 4a – ditto, phallus [scale bars 0.5 mm].

Plate 85

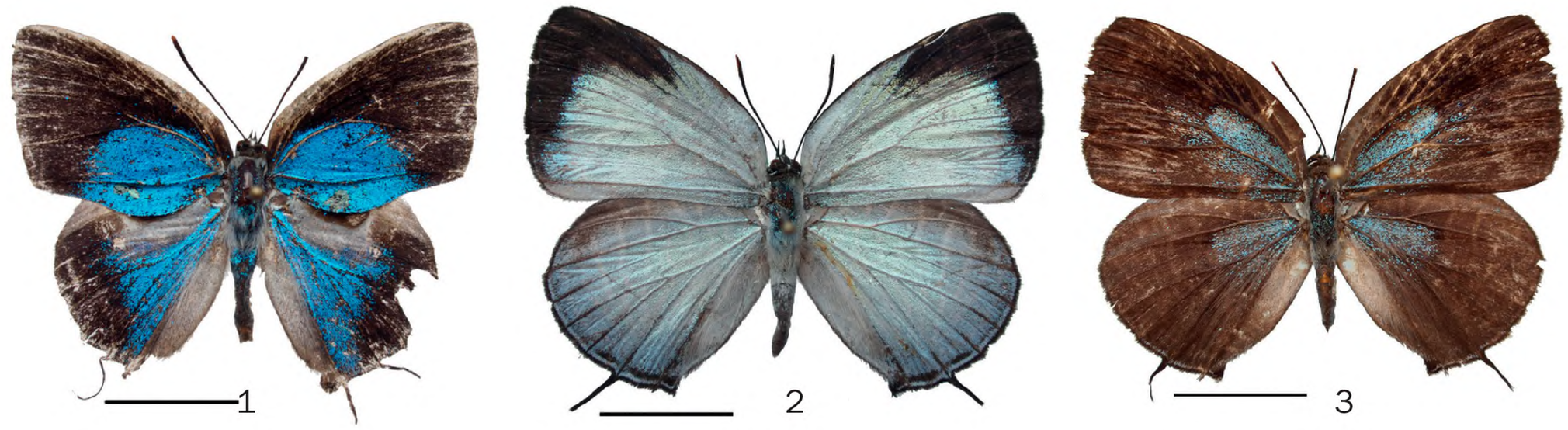
ROOS, P.H.: Peculiarities of the butterfly fauna of South-East Sulawesi



Figures 1-12. Lycaenidae from Southeast Sulawesi with their upperside (rows 1 and 3) and underside (rows 2 and 4) wing patterns. 1, 4 – Female of *Deudorix loxias* (20 km East of Kolaka), wing span: 29,0 mm; 2, 5 – *Hypothecla honos* de Nicéville, 1898 (Konawendepiha, 17.03.2013); 3, 6 – Male of *Jamides latimargus* Snellen, 1878 (Konawendepiha, 17.03.2013); 7, 10 – *J. fractilinea* Tite, 1960 (20 km E of Kolaka, 31.03.2009); 8, 11 – Male of *Amblypodia narada* Horsfield, 1829 (Porabua, 12.03.2011); 9, 12 - *Dacalana anysis* Hewitson, 1865 (Konawendepiha, 10.03.2011) [scale bars 10 mm].

Plate 86

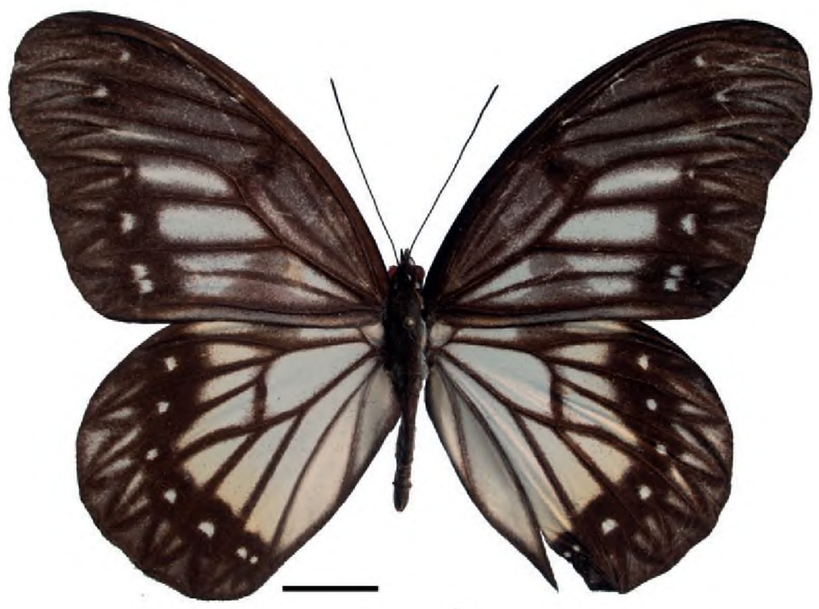
ROOS, P.H.: Peculiarities of the butterfly fauna of South-East Sulawesi



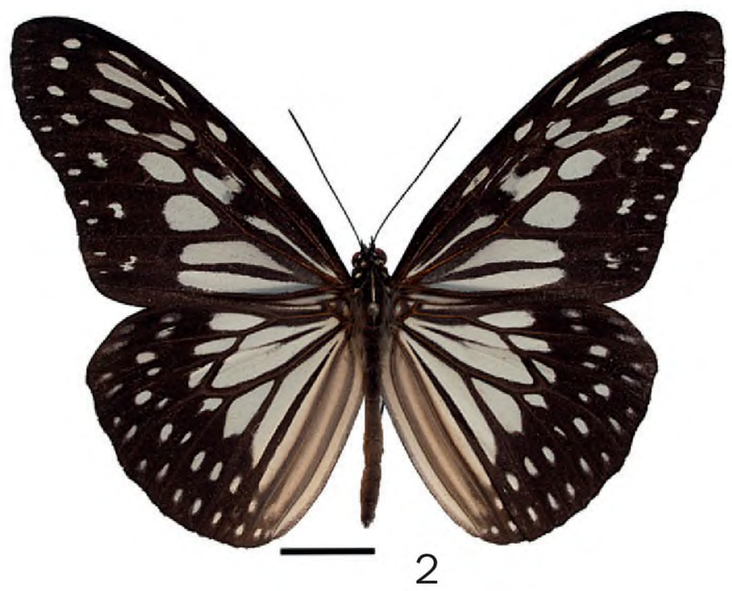
Figures 1-10. Particular butterflies from Southeast Sulawesi (upperside and underside. 1, 4 – *Dacalana anysides* Röber, 1887 (Porabua, 20.03.2013); 2, 5 – Male *Arhopala argentea* Staudinger, 1888 (20 km East of Kolaka, 20.03.2015); 3, 6 – Female *A. argentea* (20 km East of Kolaka, 22.03.2015); 7-8 – *Euthalia aconthea* Cramer, 1777 (20 km East of Kolaka, 16.10.2002), upperside (left) and underside (right); 9-10 – *Polyura attalus* Felder et Felder, 1867 (Konawehndepiha, 06.03.2011), upperside (left) and underside (right) [scale bars 10 mm].

Plate 87

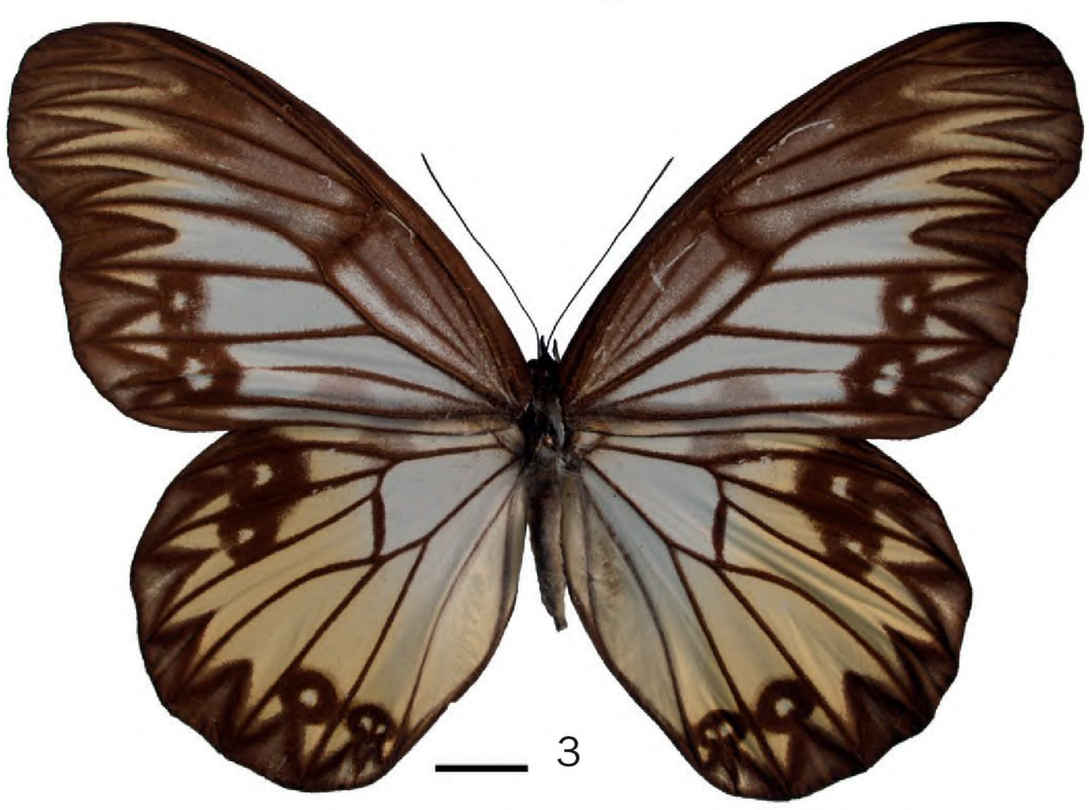
Roos, P.H.: Peculiarities of the butterfly fauna of South-East Sulawesi



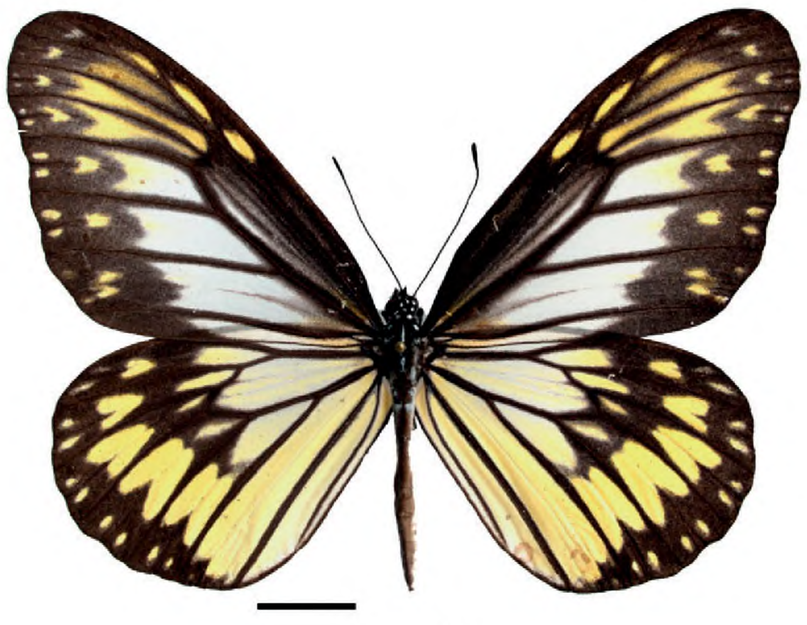
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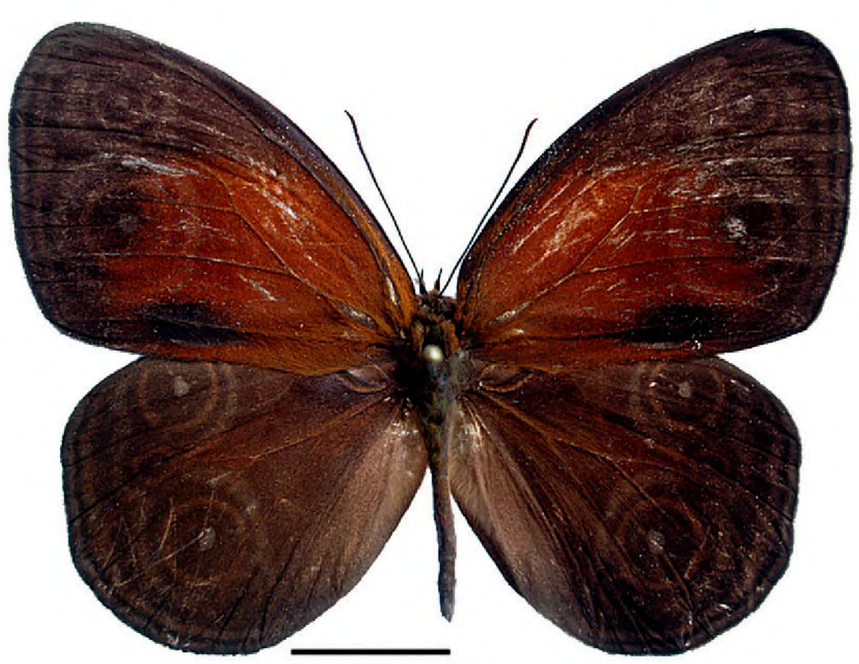
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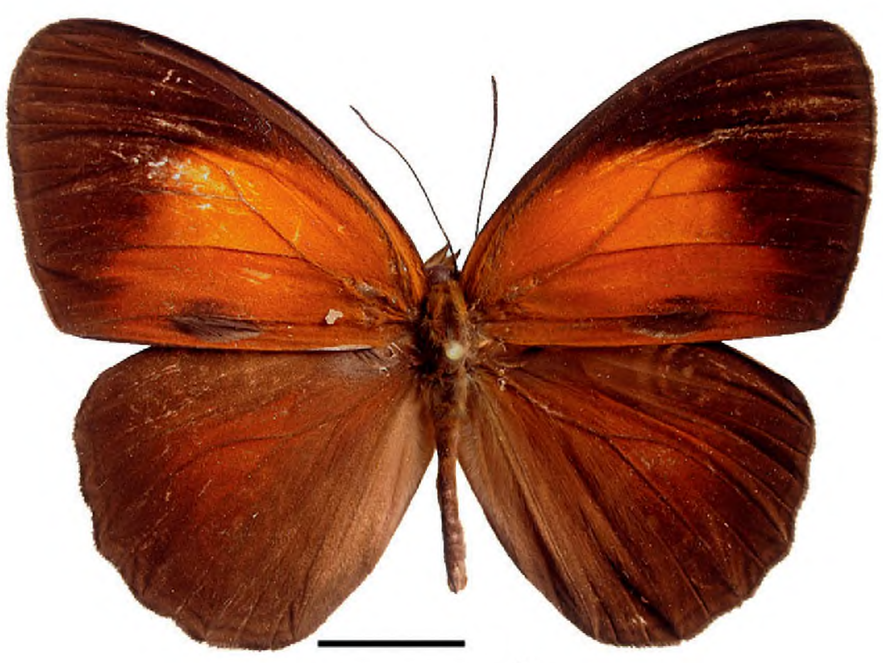
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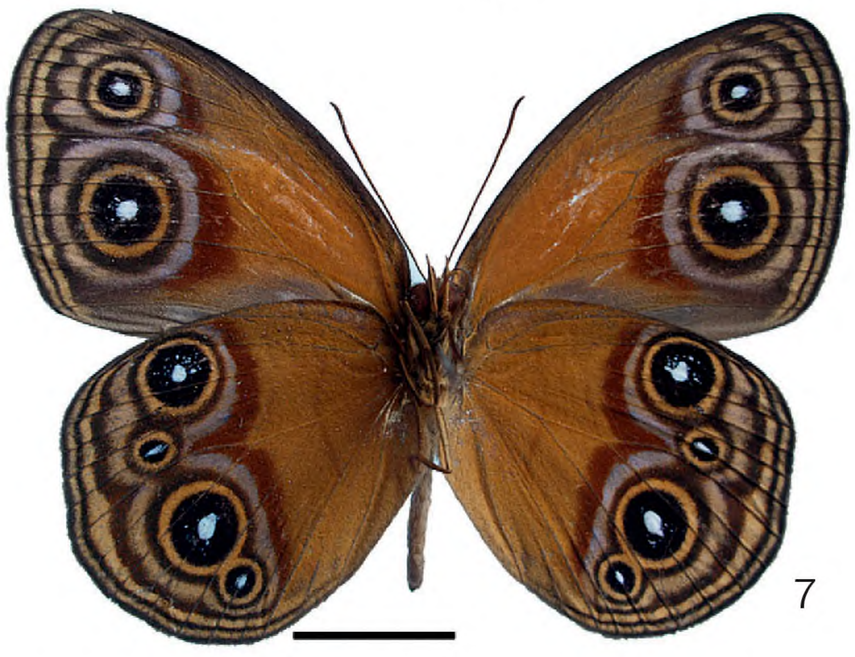
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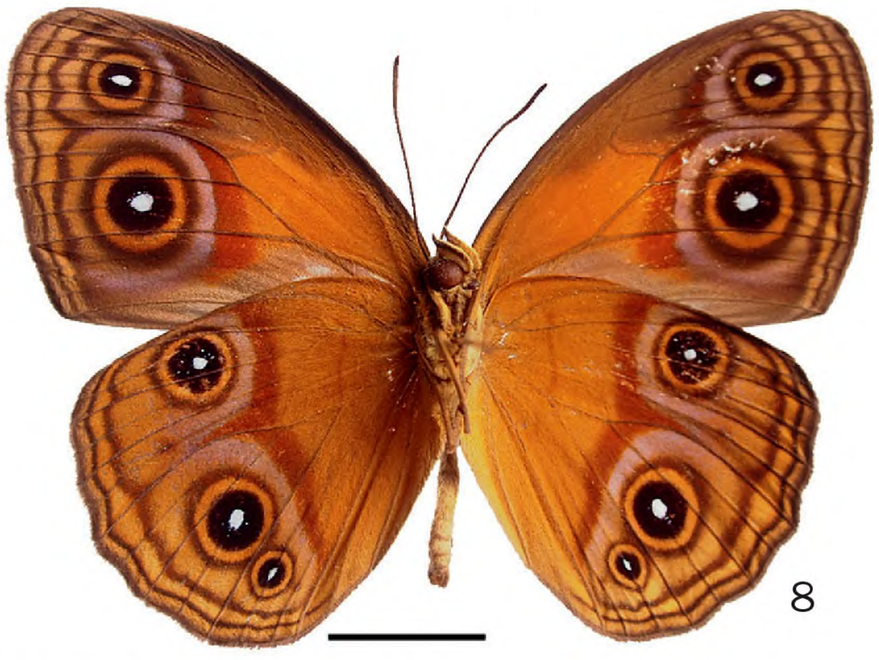
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Figures 1-8. Butterflies of Southeast Sulawesi. 1-4 – Subspecies of *Zethera incerta* Hewitson, 1861 and their prospective mimicry counterparts: 1 – *Z. incerta tenggara* Roos, 1992 (Sambeani, 02.03.1999); 2 – *Ideopsis juventa* Cramer, 1777 (Sambeani, 01.03.1999); 3 – *Z. incerta incerta* Hewitson, 1861 (Sulawesi); 4 – *I. vitrea* Blanchard, 1853 (Porabua, 24.03.2009); 5, 7 – Male of *Lohora umbrosa* Roos, 1997 (Porabua, 13.03.2011), upperside (5) and underside (7) wing pattern; 6, 8 – Male of *Lohora decipiens* Martin, 1929 for comparison (25 km E of Rantepao, 10.03.1986) [scale bars 10 mm].

Plate 88

ROOS, P.H.: Peculiarities of the butterfly fauna of South-East Sulawesi



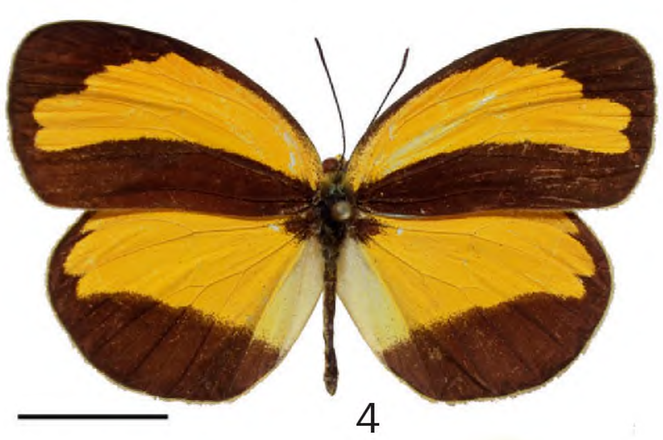
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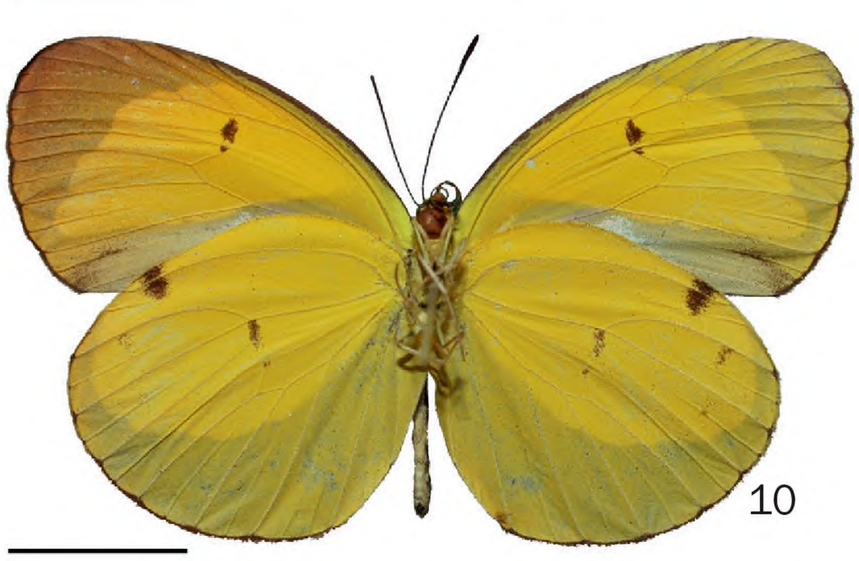
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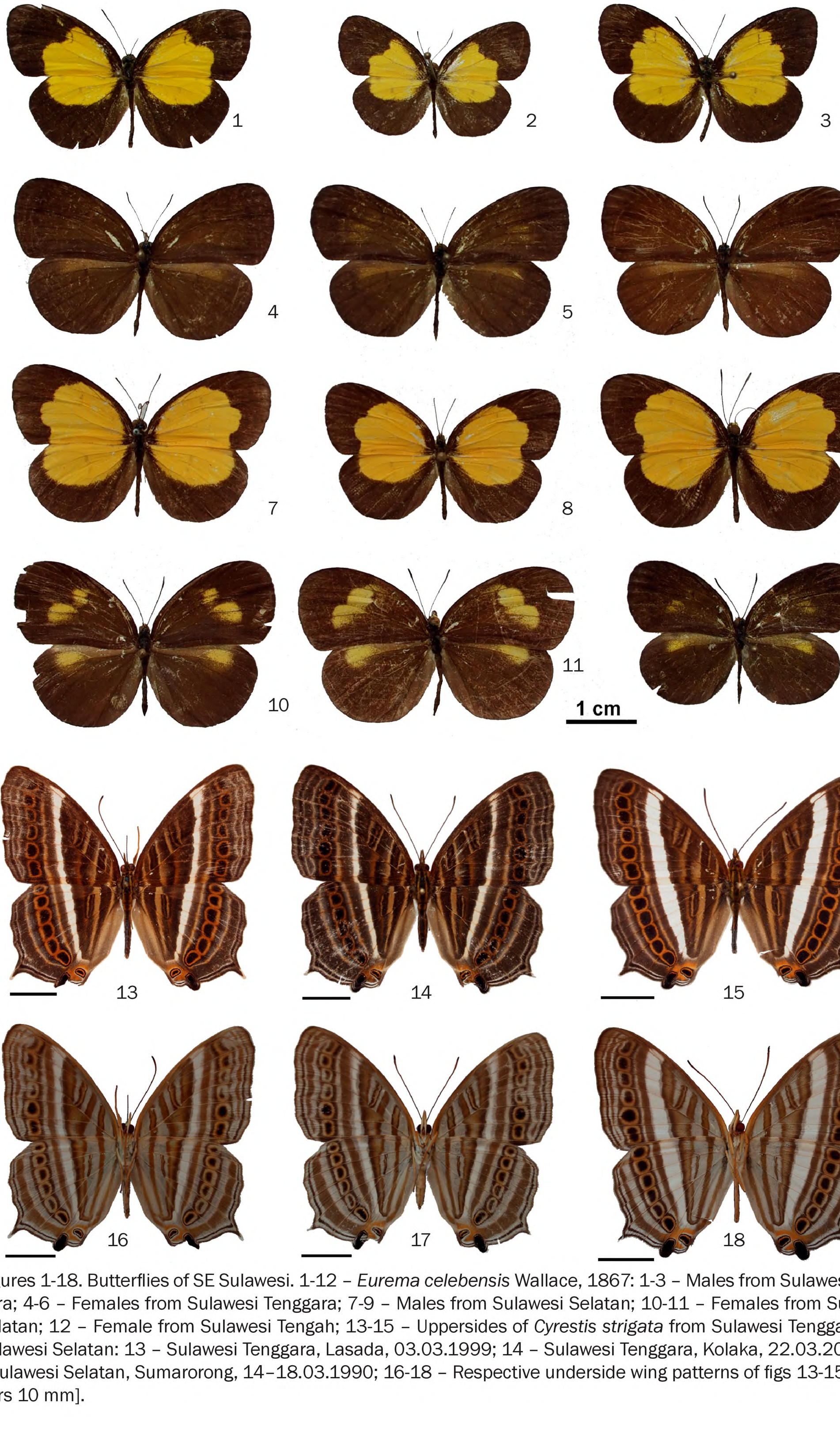


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Figures 1–12. *Eurema* from SE Sulawesi and their southwestern counterparts (1-10) and *Cepora eperia* from SE Sulawesi (11-12). 1 – Male *Eurema alitha* Felder et Felder, 1862 (SE–Sulawesi); 2 – Female of *E. alitha* (SE Sulawesi); 3 – Female *E. tominia* Vollenhoven, 1865 (SE Sulawesi), upperside; 4 – Male *E. alitha* (Southwest Sulawesi); 5 – ditto, female (Southwest Sulawesi); 6 – Underside of the female *E. tominia* shown in Fig. 3; 7-10 – Upperside (row 3) and underside (row 4) wing pattern of male *E. tominia*; 7, 9 – Male from Kolaka, SE Sulawesi. 8, 10 – Male from Sumarorong, SW Sulawesi; 11–12 – *Cepora eperia* Boisduval, 1836 (Porabua, 26.03.2009) [scale bars 10 mm].

Plate 89

ROOS, P.H.: Peculiarities of the butterfly fauna of South-East Sulawesi



Figures 1-18. Butterflies of SE Sulawesi. 1-12 – *Eurema celebensis* Wallace, 1867: 1-3 – Males from Sulawesi Tenggara; 4-6 – Females from Sulawesi Tenggara; 7-9 – Males from Sulawesi Selatan; 10-11 – Females from Sulawesi Selatan; 12 – Female from Sulawesi Tengah; 13-15 – Uppersides of *Cyrestis strigata* from Sulawesi Tenggara and Sulawesi Selatan: 13 – Sulawesi Tenggara, Lasada, 03.03.1999; 14 – Sulawesi Tenggara, Kolaka, 22.03.2013; 15 –Sulawesi Selatan, Sumarorong, 14–18.03.1990; 16-18 – Respective underside wing patterns of figs 13-15 [scale bars 10 mm].



Figures 1-16. Different subspecies of *Cyrestis paulinus* Felder et Felder, 1860. 1 – ssp. *kransi* Jurriaanse et Lindemans, 1920, SE Sulawesi; 2 – ssp. *mantilis* Staudinger, 1886, Sulawesi Tengah; 3–8 – Variability in ssp. *kransi*, SE Sulawesi; 9-10 – ssp. *mantilis*, Koyoan, East Sulawesi; 11 – ssp. *mantilis*, Toraut, North Sulawesi; 12 – ssp. *mantilis*, Palu, Central–Sulawesi; 13 – ssp. *kuehni* Röber, 1886, Peleng Island; 14 – ssp. *seneca* Wallace, 1869, Taliabu (Sula Islands); 15 – ssp. *gilolensis* Lathy, 1904, Seram (Maluku Islands); 16 – ssp. *waigeuensis* Fruhstorfer, 1900, Waigeo (Raja Ampat Archipelago) [scale bars 10 mm].

Figures 1-10. Comparison of *Lexias aeetes* Hewitson, 1861 and *Neptis ida* Moore, 1858 from Southeast and Southwest Sulawesi. 1-4 – *Lexias aeetes*: 1-2 – Male from SE Sulawesi, upperside (first row) and underside (second row); 3-4 – Male from Southwest Sulawesi, upperside (first row) and underside (second row); 5-7 – Uppersides of *Neptis ida*: 5 – Sambeani; 6 – Porabua; 7 – Sumarorong (Sulawesi Selatan); 8-10 – Respective underside wing patterns of figs 5-7 [scale bars 10 mm].



Figures 1-2. *Australobolbus arfakianus* sp. nov., holotype ♀. 1 – Habitus, dorsal view; 2 –ditto, lateral view.



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Figures 1-2. *Australobolbus arfakianus* sp. nov. habitat. 1 – Primary mid-montane rainforest in the type locality of this species; 2 – Place of installation of the light trap (consider two vertical sticks at the nearest fallen tree) (photos: D.Telnov, 2015).



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Figures 1-5. *Chariochilus metallescens* Brenske, 1898, syntype ♂. 1 – Habitus, dorsal view; 2 – ditto, dorso-lateral view; 3 – ditto, front view; 4 – ditto, lateral view; 5 – Apex of elytra and pygidium, back view (photo: C.-L. Li, 2017).



Figure 1. *Chariochilus tamarau* sp. nov. holotype ♂: habitus, dorsal view.

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Figures 1-2. *Chariochilus tamarau* sp. nov. holotype ♂. 1 – Head, dorsal view; 2 – Forebody, lateral view.



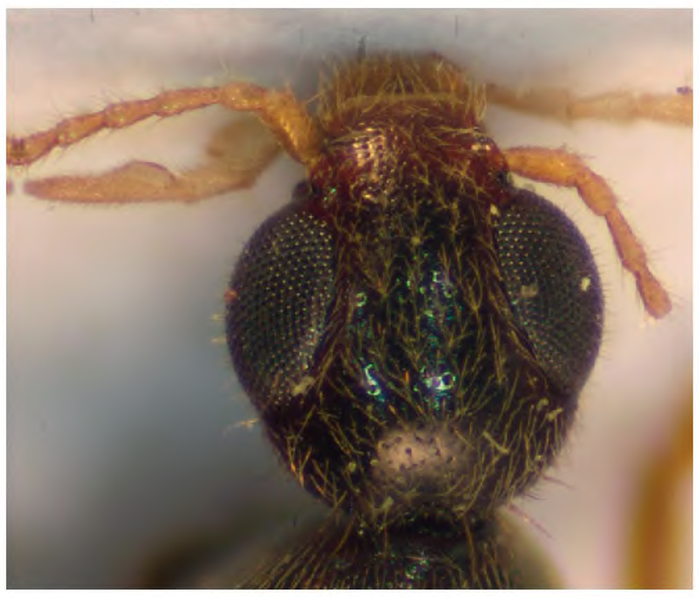
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Figures 1-6. New species of *Macratria* Newman, 1838 from Wallacea and New Guinea, dorsal view. 1 – *M. ayamaru* sp. nov., habitus, paratype ♂; 2 – ditto, head; 3 – *M. berdnikovi* sp. nov., habitus, holotype ♂; 4 – ditto, forebody; 5 – *M. citak* sp. nov., habitus, holotype ♂; 6 – ditto, forebody.

Plate 98

TELNOV, D.: New records and new species of Macratriinae from the Papuan Region (Coleoptera: Anthicidae), 2



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Figures 1-6. *Macratria eparaksts* sp. nov., dorsal view. 1 – Habitus, holotype ♂; 2 – ditto, forebody; 3 – Habitus, paratype ♂ from Senggo vill. env.; 4 – ditto, forebody; 5 – Habitus, paratype ♀ from Senggo vill. env.; 6 – ditto, forebody. Consider constricted head base of paratypes and flattened male 8-11 antennomeres.



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Figures 1-7. New species of *Macratria* Newman, 1838 from Wallacea and New Guinea, dorsal view. 1 – *M. marind* sp. nov., habitus, holotype ♂; 2 – ditto, forebody; 3 – ditto, paratype ♀; 4 – *M. obiensis* sp. nov., habitus, paratype ♂; 5 – ditto, forebody; 6 – ditto, forebody of another paratype ♂; 7 – ditto, paratype ♀.



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Figures 1-4. New species of *Macratria* Newman, 1838 from Wallacea, dorsal view. 1 – *M. patani* sp. nov., habitus, holotype ♂; 2 – ditto, forebody; 3 – *M. sahu* sp. nov., habitus, paratype ♂; 4 – ditto, forebody.

Plate 101

THEISCHINGER, G. & RICHARDS, S.J.: Insular odonates in Melanesia: a new species of damselfly from Manus Island ...



Figure 1. *Drepanosticta gazelle* sp. nov. ♂, lateral view (photo: S.J. Richards).



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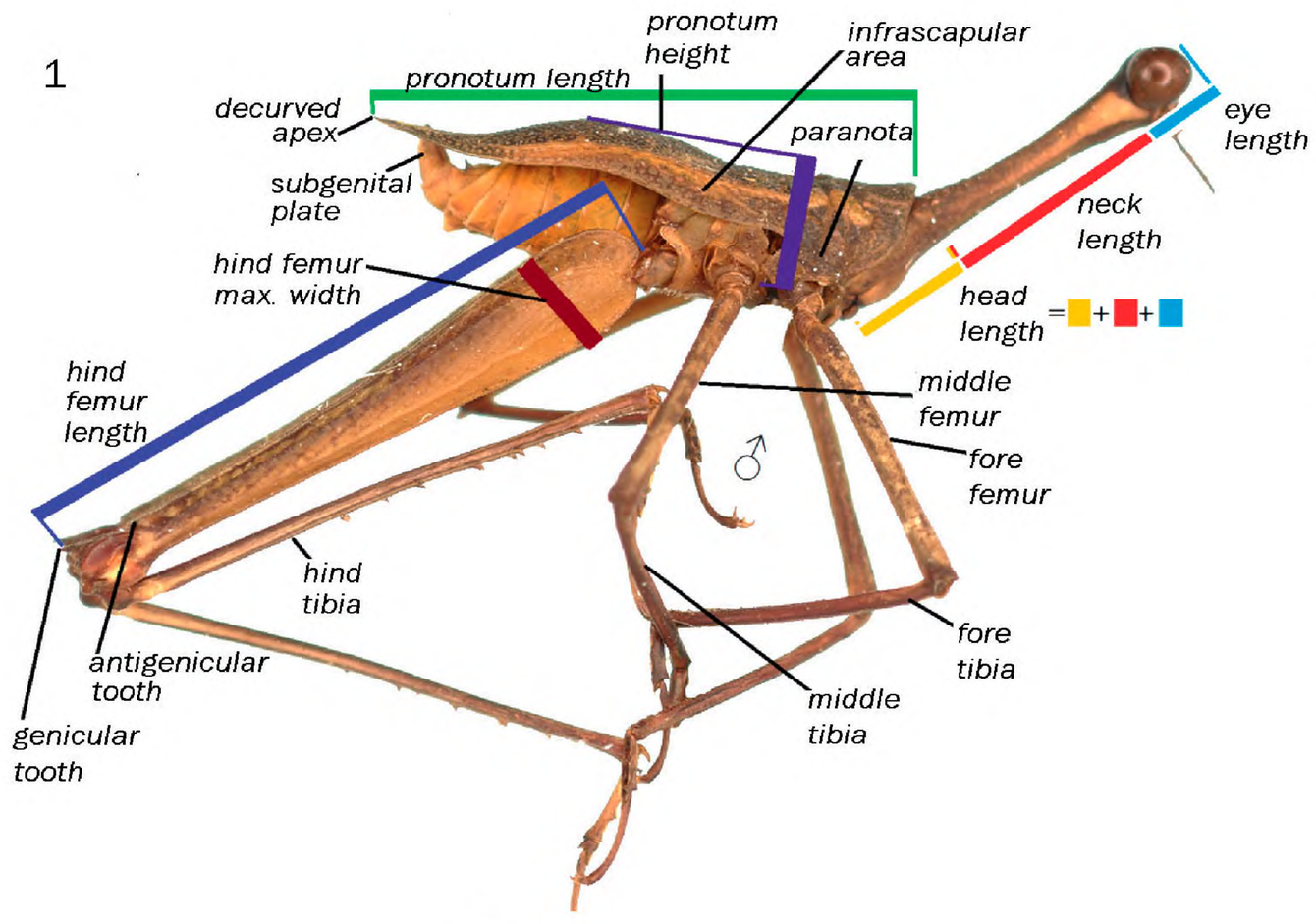
Figures 1-3. Manus Island damseflies. 1 – *Drepanosticta gazelle* sp. nov. ♀, lateral view; 2-3: *Nososticta manuscola* Theischinger et Richards, 2015: 2 – ♂, lateral view; 3 – ♀, lateral view (photos: S.J. Richards).

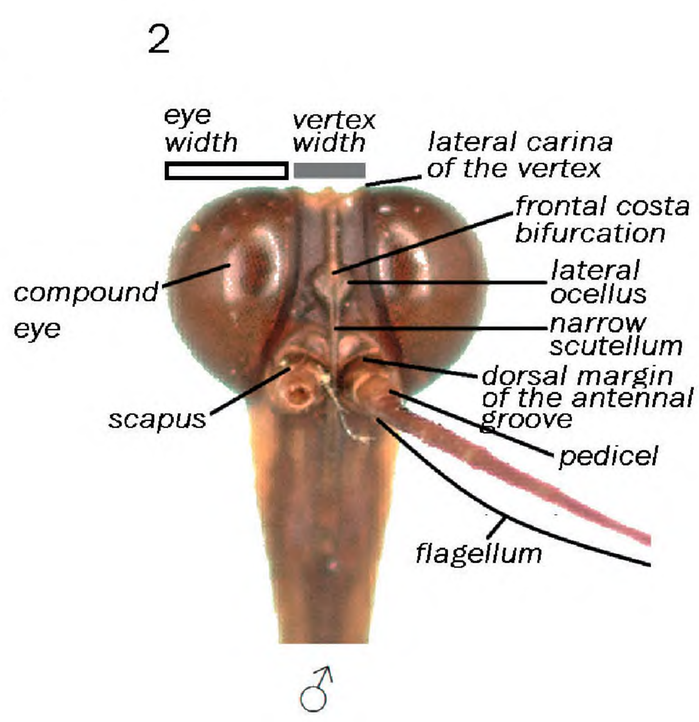
Plate 103

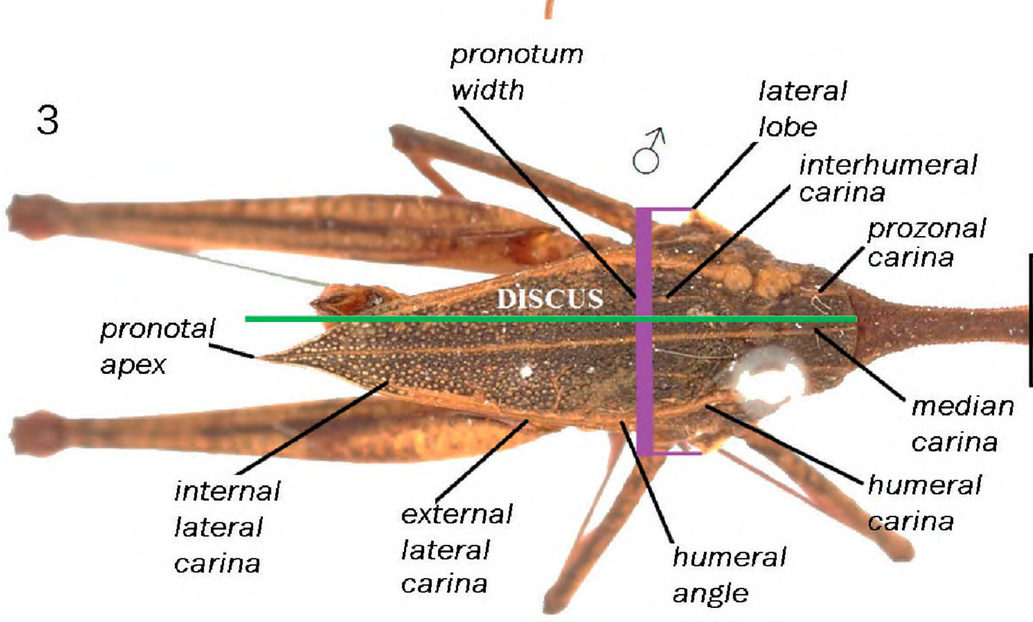
THEISCHINGER, G. & RICHARDS, S.J.: Insular odonates in Melanesia: a new species of damselfly from Manus Island ...

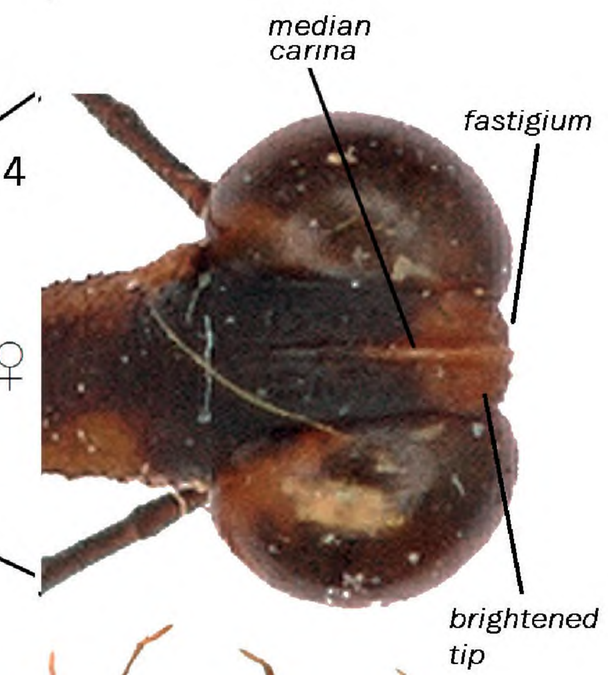


Figure 1. Forest stream on the upper slopes of Mt Sabomu, Manus Island, habitat of both *Drepanosticta gazelle* sp. nov. and *Nososticta manuscola* Theischinger et Richards, 2015 (photo: S.J. Richards).











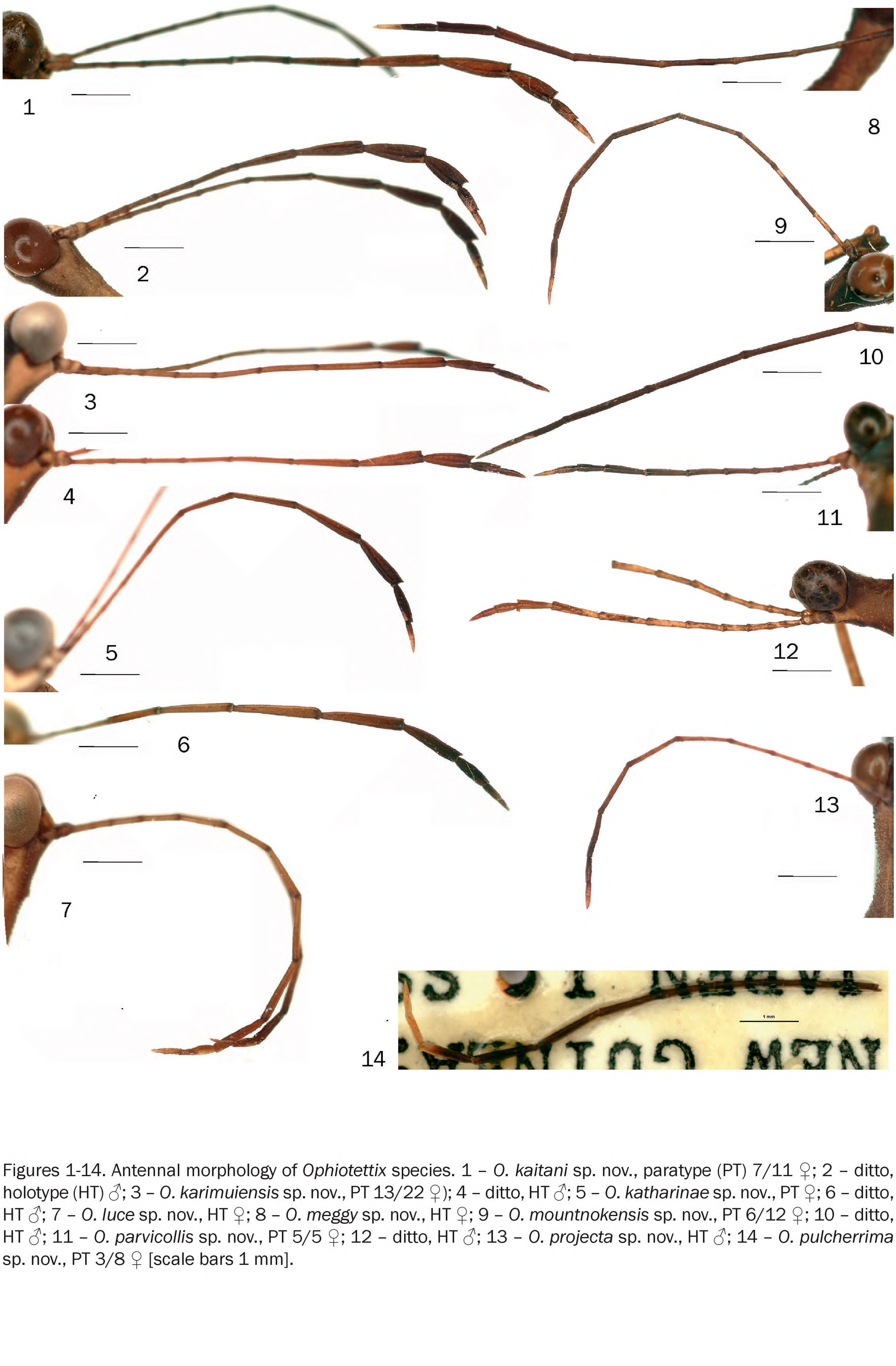


Figures 1-7. Morphology and measurements relevant for *Ophiotettix* taxonomy. 1-4 – Morphological terminology and measurements shown on the example of *O. scolopax* Bolívar, 1929, various views; 5 – Living specimen of undescribed *Ophiotettix* sp. from Muller range, Papua New Guinea, Southern Highlands Province (photo: P. Naskrecki, published with permission); 6-7 – Nymph morphology shown on the example of *O. bomberaiensis* sp. nov. [scale bar 1 cm].

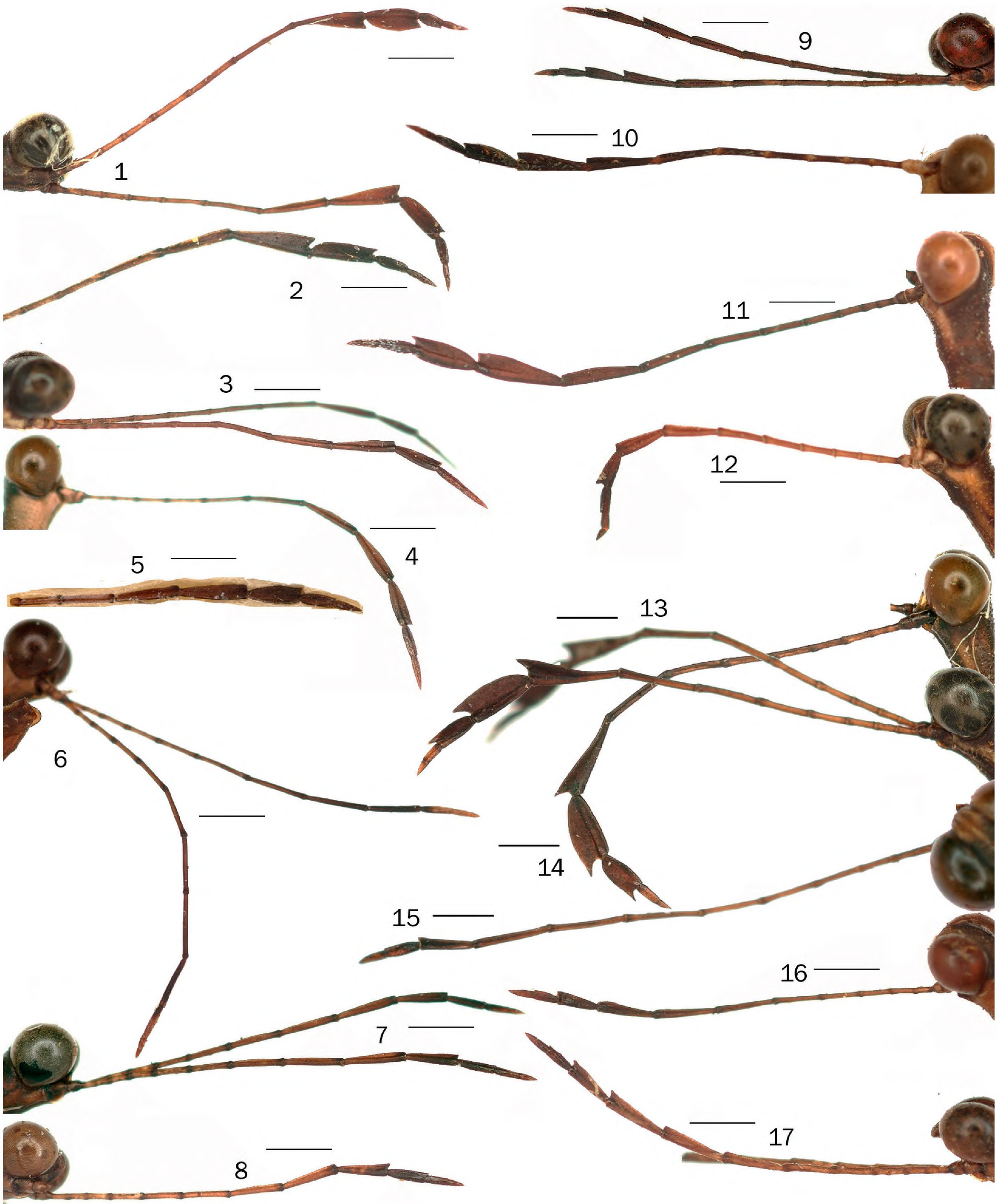
Plate 105



Figures 1-17. Antennal morphology of *Ophiotettix* species. 1 – *O. amberiana* sp. nov., holotype (HT) ♂; 2 – *O. bewana* sp. nov., HT ♀; 3 – *O. bomberaiensis* sp. nov., paratype (PT) 20/27 ♀; 4 – ditto, HT ♂; 5 – *O. brevicollis* sp. nov., PT 13/41 ♀; 6 – ditto, HT ♂; 7 – *O. cheesmanae* sp. nov., HT ♀; 8 – *O. depressa* sp. nov., PT 1/4 ♀; 9 – ditto, HT ♂; 10 – *O. filiforma* sp. nov., PT 5/31 ♀; 11 – ditto, HT ♂; 12 – *O. flyriveriensis* sp. nov., PT 21/24 ♀; 13 – ditto, HT ♂; 14 – *O. fritzpahli* sp. nov., HT ♂; 15 – ditto, PT 1/18 ♀; 16 – *O. hansscholteni* sp. nov., PT 1/3 ♀; 17 – *O. imbiana* sp. nov., HT ♂ [scale bars 1 mm].



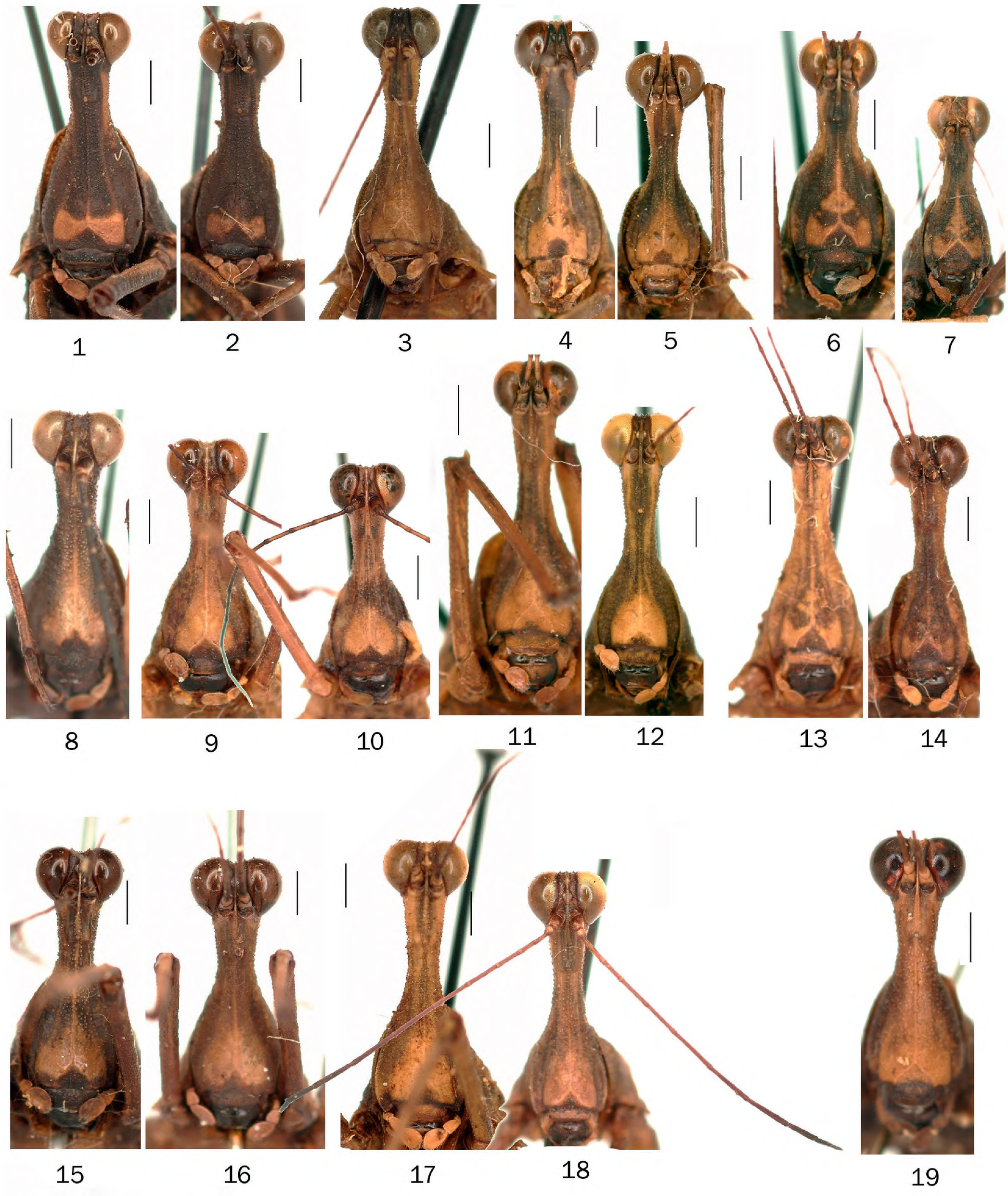
Figures 1-14. Antennal morphology of *Ophiotettix* species. 1 – *O. kaitani* sp. nov., paratype (PT) 7/11 ♀; 2 – ditto, holotype (HT) ♂; 3 – *O. karimuiensis* sp. nov., PT 13/22 ♀); 4 – ditto, HT ♂; 5 – *O. katharinae* sp. nov., PT ♀; 6 – ditto, HT ♂; 7 – *O. luce* sp. nov., HT ♀; 8 – *O. meggy* sp. nov., HT ♀; 9 – *O. mountnokensis* sp. nov., PT 6/12 ♀; 10 – ditto, HT ♂; 11 – *O. parvicollis* sp. nov., PT 5/5 ♀; 12 – ditto, HT ♂; 13 – *O. projecta* sp. nov., HT ♂; 14 – *O. pulcherrima* sp. nov., PT 3/8 ♀ [scale bars 1 mm].



Figures 1-17. Antennal morphology of *Ophiotettix* species. 1 – *O. pushkari* sp. nov., holotype (HT) ♂; 2 – ditto, paratype (PT) ♀; 3 – *O. quateorum* sp. nov., HT ♀; 4 – ditto, PT 1/8 ♀; 5 – ditto, PT 7/8 ♂; 6 – *O. rebrinae* sp. nov., HT ♂; 7 – *O. roesleri* sp. nov., PT 1/18 ♀; 8 – ditto, HT ♂; 9 – *O. rohwedderi* sp. nov., PT 1/5 ♀; 10 – *O. sanguinea* sp. nov., HT ♀; 11 – *O. schapinae* sp. nov., HT ♀; 12 – *O. stallei* sp. nov., HT ♂; 13 – *O. storozhenkoi* sp. nov., PT ♀; 14 – ditto, HT ♂; 15 – *O. subbrevicollis* sp. nov., PT 1/11 ♀; 16 – ditto, HT ♂; 17 – *O. telefominensis* sp. nov., HT ♂ [scale bars 1 mm].



Figures 1-14. Antennal morphology of *Ophiotettix* species. 1 – *O. tenuis* sp. nov., paratype (PT) 1/3 ♀; 2 – ditto, holotype (HT) ♂; 3 – *O. toxopei* sp. nov., PT 3/11 ♀; 4 – ditto, HT ♂; 5 – *O. buergersi* Bolívar, 1929, HT ♂; 6 – *O. cygnicollis* Walker, 1871, ♂ from Ramoi, Doberai Peninsula, W New Guinea (not a type); 7 – ditto, ♀ from Ransiki, Doberai Peninsula, W New Guinea (not a type); 8 – *O. limosina* (Snellen van Vollenhoven, 1865), lectotype ♀; 9 – ditto, ♂ from Klamono, Doberai Peninsula, W New Guinea (not a type); 10 – *O. lorentzi* Bolívar, 1929, HT ♀; 11 – *O. modesta* Bolívar, 1929, PT ♂; 12 – ditto, HT ♂; 13 – *O. scolopax* Bolívar, 1929, HT ♀; 14 – *O. westwoodi* Bolívar, 1929 stat. rev., HT ♂ [scale bars 1 mm].



Figures 1-19. Heads of *Ophiotettix* species in frontal view. 1 – *O. amberiana* sp. nov., paratype (PT) 1/7 ♀; 2 – ditto, holotype (HT) ♂; 3 – *O. bewana* sp. nov., HT ♀; 4 – *O. bomberaiensis* sp. nov., PT 20/27 ♀; 5 – ditto, HT ♂; 6 – *O. brevicollis* sp. nov., PT 13/41 ♀; 7 – ditto, HT ♂; 8 – *O. cheesmanae* sp. nov., HT ♀; 9 – *O. depressa* sp. nov., PT 1/4 ♀; 10 – ditto, HT ♂; 11 – *O. filiforma* sp. nov., HT ♂; 12 – ditto, PT 5/31 ♀; 13 – *O. flyriveriensis* sp. nov., PT 21/24 ♀; 14 – ditto, HT ♂, 15 – *O. fritzpahli* sp. nov., PT 1/18 ♀; 16 – ditto, HT ♂; 17 – *O. hansscholteni* sp. nov., PT 1/3 ♀; 18 – ditto, HT 1/3 ♂; 19 – *O. imbiana* sp. nov., HT ♂ [scale bars 1 mm].



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Figures 1-14. Heads of *Ophiotettix* species in frontal view. 1 – *O. kaitani* sp. nov., paratype (PT) 7/11 ♀; 2 – ditto, holotype (HT) ♂; 3 – *O. karimuiensis* sp. nov., PT 13/22 ♀; 4 – ditto, HT ♂; 5 – *O. katharinae* sp. nov., PT ♀; 6 – ditto, HT ♂; 7 – *O. luce* sp. nov., HT ♀; 8 – *O. meggy* sp. nov., HT ♀; 9 – *O. mountnokensis* sp. nov., HT ♂; 10 – ditto, PT 6/12 ♀; 11 – *O. parvicollis* sp. nov., PT 5/5 ♀; 12 – ditto, HT ♂; 13 – *O. projecta* sp. nov., HT ♂; 14 – *O. pulcherrima* sp. nov., PT 3/8 ♀ [scale bars 1 mm].



Figures 1-19. Heads of *Ophiotettix* species in frontal view. 1 – *O. pushkari* sp. nov., paratype (PT) ♀; 2 – ditto, holotype (HT) ♂; 3 – *O. quateorum* sp. nov., HT ♀; 4 – ditto, PT 1/8 ♀; 5 – *O. rebrinae* sp. nov., HT ♂; 6 – *O. roesleri* sp. nov., PT 1/18 ♀; 7 – ditto, HT ♂; 8 – *O. rohwedderi* sp. nov., PT 1/5 ♀; 9 – ditto, HT ♂; 10 – *O. sanguinea* sp. nov., HT ♀; 11 – ditto, PT 3/4 ♀; 12 – *O. schapinae* sp. nov., HT ♀; 13 – ditto, PT ♀; 14 – *O. stallei* sp. nov., HT ♂; 15 – *O. storozhenkoi* sp. nov., PT ♀; 16 – ditto, HT ♂; 17 – *O. subbrevicollis* sp. nov., PT 1/11 ♀; 18 – ditto, HT ♂; 19 – *O. telefominensis* sp. nov., HT ♂ [scale bars 1 mm].



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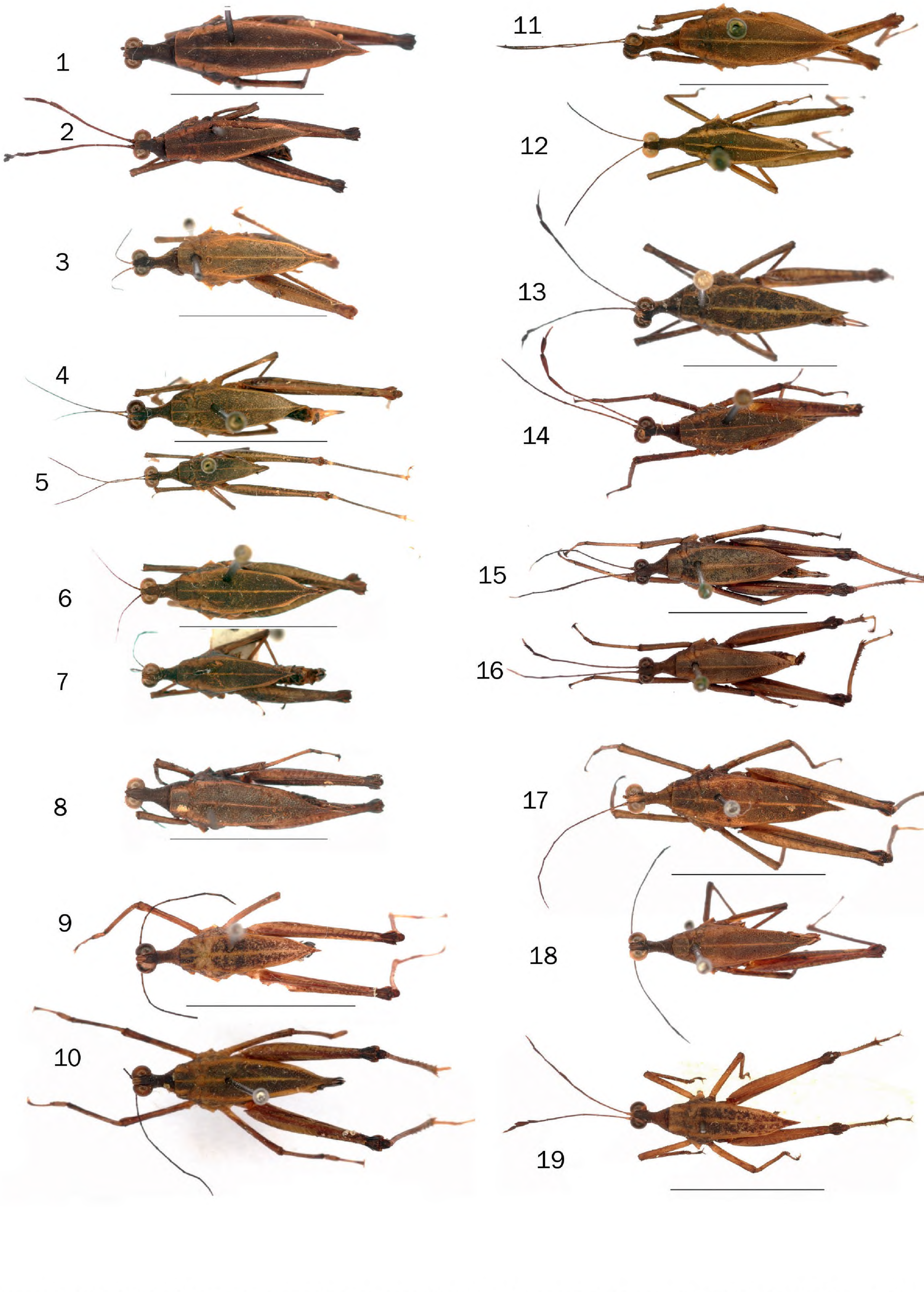


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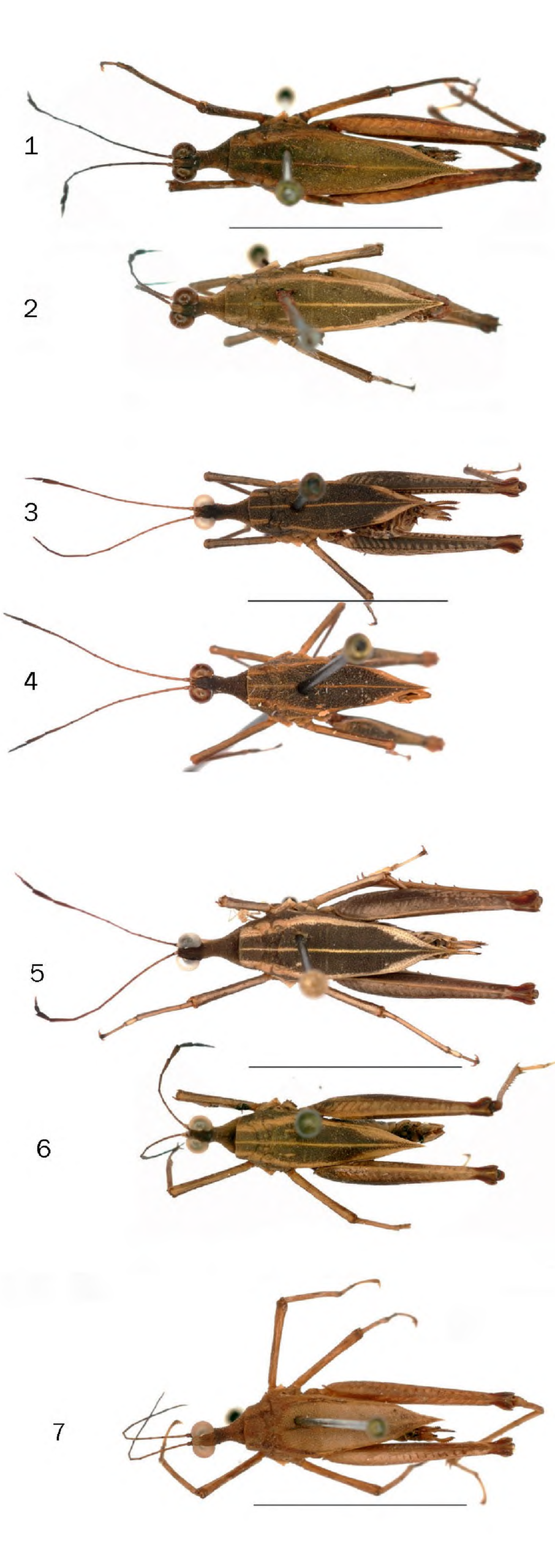


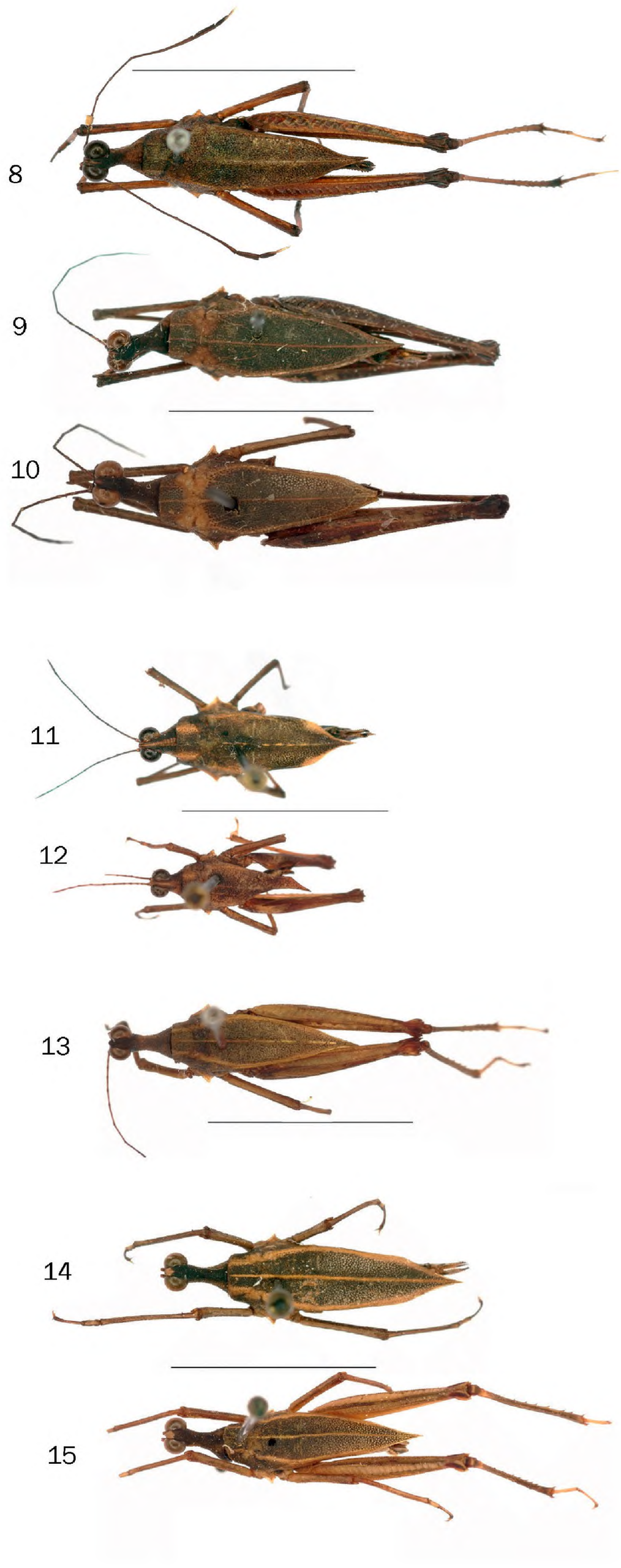
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Figures 1-19. Heads of *Ophiotettix* species in frontal view. 1 – *O. tenuis* sp. nov., paratype (PT) 1/3 ♀; 2 – ditto, holotype (HT) ♂; 3 – *O. toxopei* sp. nov., PT 3/11 ♀; 4 – ditto, HT ♂; 5 – *O. buergersi* Bolívar, 1929, PT labelled as allotype ♀; 6 – ditto, HT ♂; 7 – *O. cygnicollis* Walker, 1871, HT ♀; 8 – ditto, ♂ syntype of *Tetricodina luteomarginata* Westwood, 1874; 9 – *O. limosina* (Snellen van Vollenhoven, 1865), paralectotype ♀; 10 – ditto, lectotype ♀ labelled as holotype; 11 – ditto, ♂ from Klamono, Doberai Peninsula, W New Guinea (not a type); 12 – *O. lorentzi* Bolívar, 1929, HT ♀; 13 – *O. modesta* Bolívar, 1929, ♀ from Regenberg, N New Guinea (not a type); 14 – ditto, ♂ from Regenberg, N New Guinea (not a type); 15 – ditto, HT ♂; 16 – *O. scolopax* Bolívar, 1929, HT ♀; 17 – ditto, PT ♂; 18 – *O. westwoodi* Bolívar, 1929 stat. rev., PT ♀ labelled as allotype; 19 – ditto, HT ♂ [scale bars 1 mm].

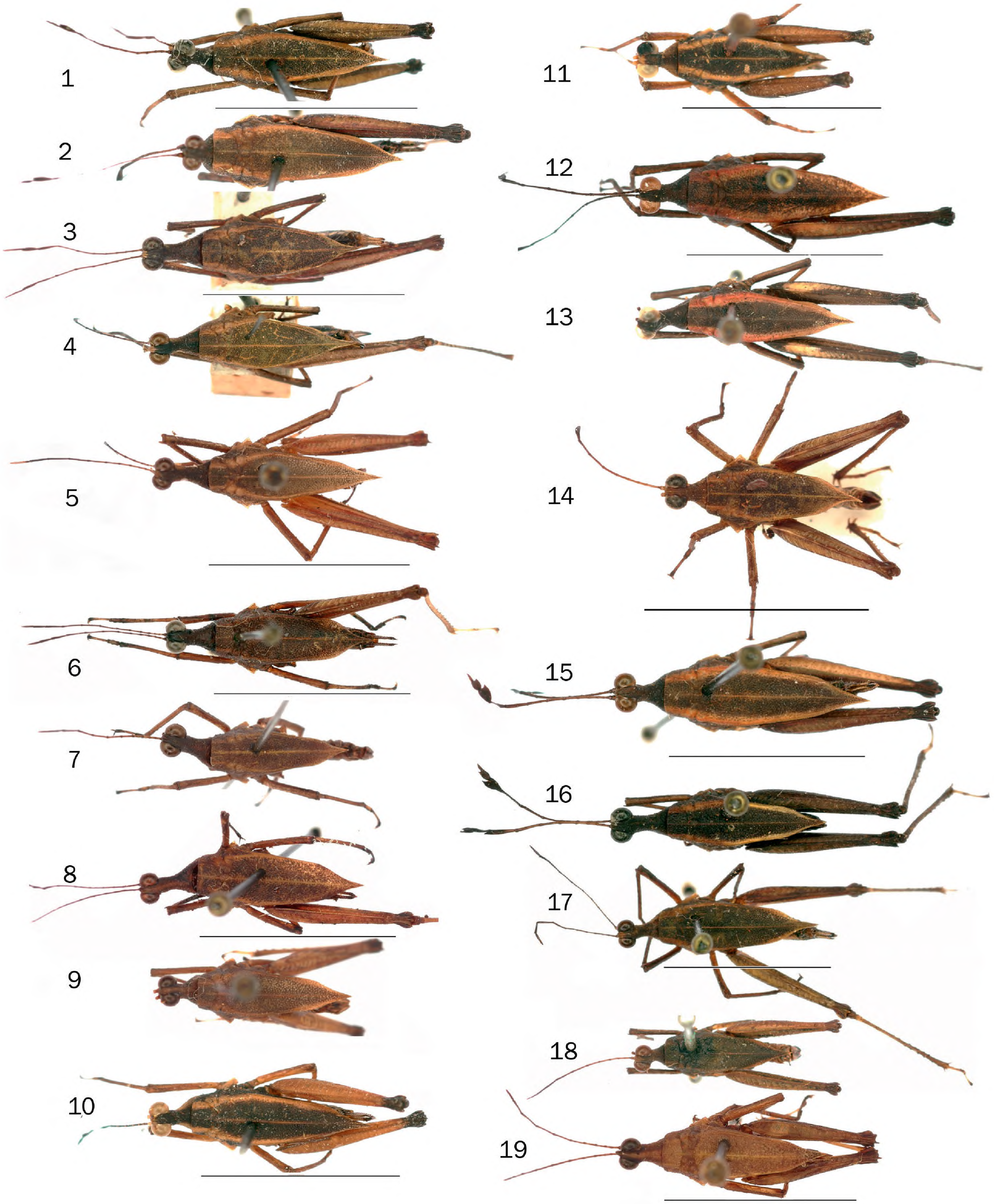


Figures 1-19. Habitus of *Ophiotettix* species in dorsal view. 1 – *O. amberiana* sp. nov., paratype (PT) 1/7 ♀; 2 – ditto, holotype (HT) ♂; 3 – *O. bewana* sp. nov., HT ♀; 4 – *O. bomberaiensis* sp. nov., PT 20/27 ♀; 5 – ditto, HT ♂; 6 – *O. brevicollis* sp. nov., PT 13/41 ♀; 7 – ditto, HT ♂; 8 – *O. cheesmanae* sp. nov., HT ♀; 9 – *O. depressa* sp. nov., HT ♂; 10 – ditto, PT 1/4 ♀; 11 – *O. filiforma* sp. nov., PT 5/31 ♀; 12 – ditto, HT ♂; 13 – *O. flyriveriensis* sp. nov., PT 21/24 ♀; 14 – ditto, HT ♂, 15 – *O. fritzpahli* sp. nov., PT 1/18 ♀; 16 – ditto, HT ♂; 17 – *O. hansscholteni* sp. nov., PT 1/3 ♀; 18 – ditto, HT ♂; 19 – *O. imbiana* sp. nov., HT ♂ [scale bars 1 cm].

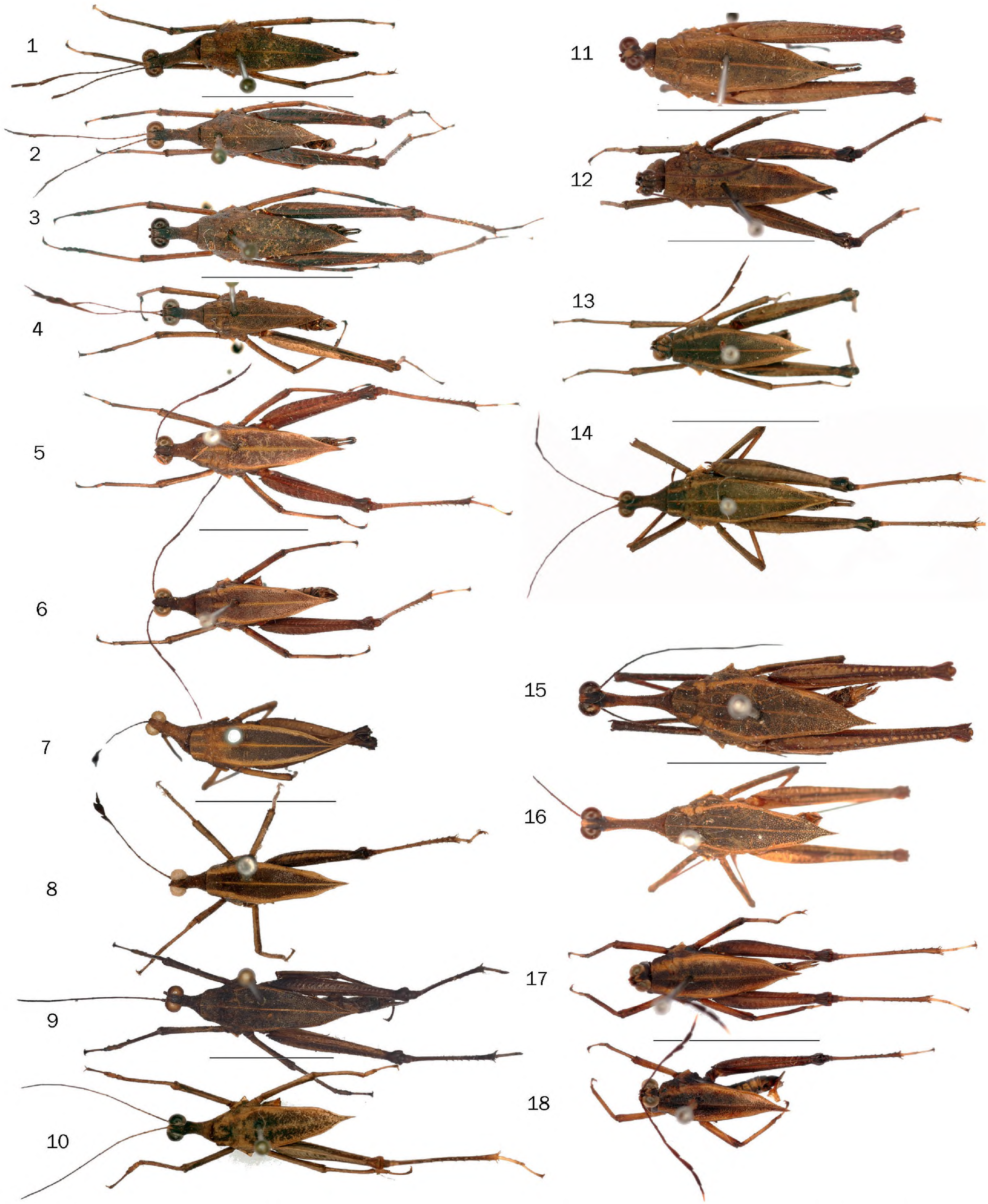




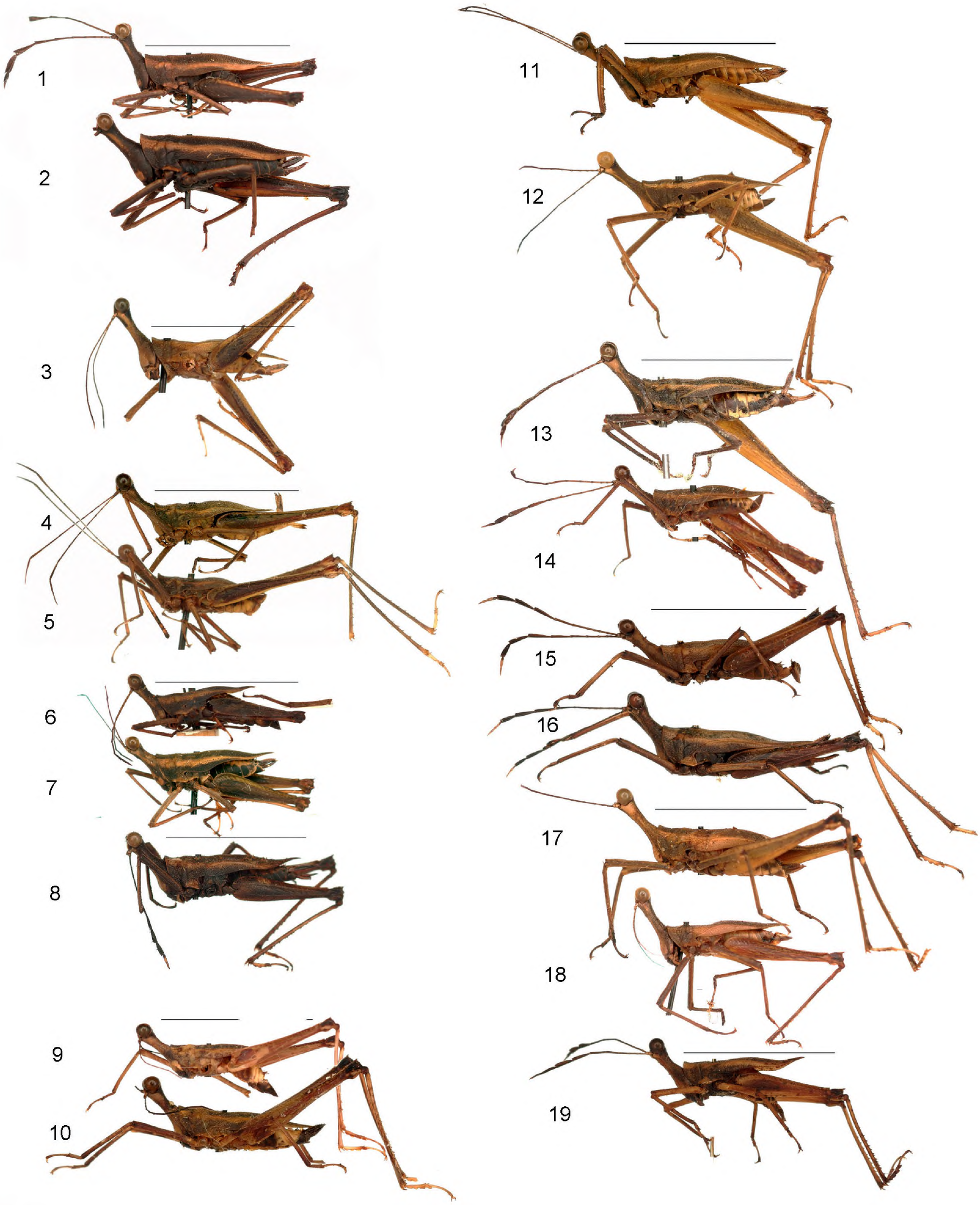
Figures 1-15. Habitus of *Ophiotettix* species in dorsal view. 1 – *O. kaitani* sp. nov., paratype (PT) ♀; 2 – ditto, holotype (HT) ♂; 3 – *O. karimuiensis* sp. nov., PT 13/22 ♀; 4 – ditto, HT ♂; 5 – *O. katharinae* sp. nov., PT ♀; 6 – ditto, HT ♂; 7 – *O. luce* sp. nov., HT ♀; 8 – *O. meggy* sp. nov., HT ♀; 9 – *O. mountnokensis* sp. nov., PT 6/12 ♀; 10 – ditto, HT ♂; 11 – *O. parvicollis* sp. nov., PT 5/5 ♀; 12 – ditto, HT ♂; 13 – *O. projecta* sp. nov., HT ♂; 14 – *O. pulcherrima* sp. nov., PT 3/8 ♀; 15 – ditto, PT 7/8 ♂ [scale bars 1 cm].



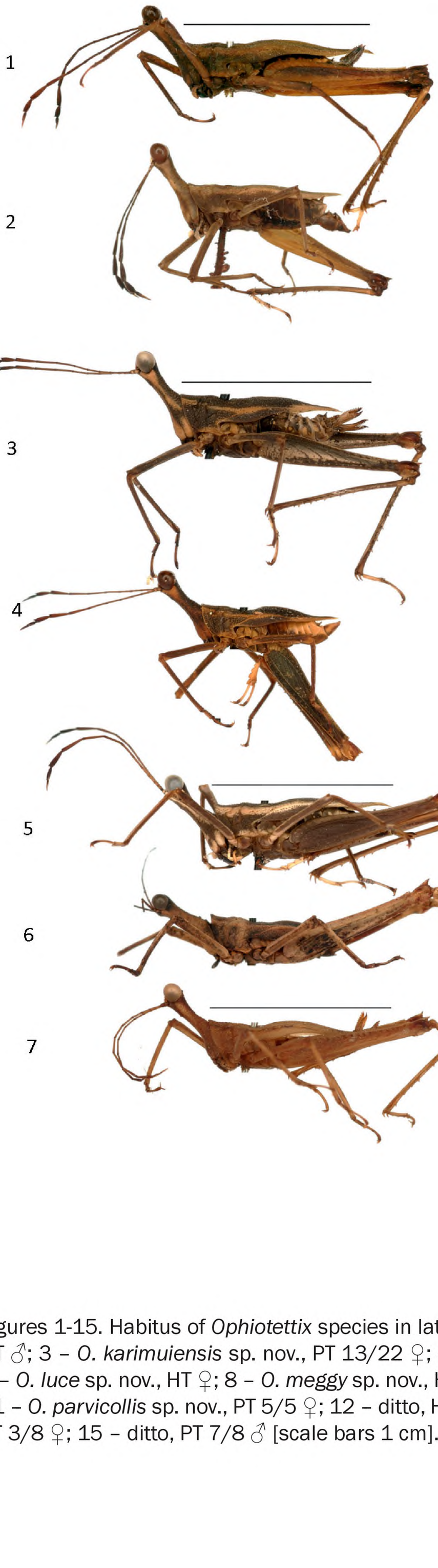
Figures 1-19. Habitus of *Ophiotettix* species in dorsal view. 1 – *O. pushkari* sp. nov., holotype (HT) ♂; 2 – ditto, paratype (PT) ♀; 3 – *O. quateorum* sp. nov., HT ♀; 4 – ditto, PT 1/8 ♀; 5 – *O. rebrinae* sp. nov., HT ♂; 6 – *O. roesleri* sp. nov., PT 1/18 ♀; 7 – *O. roesleri* sp. nov., HT ♂; 8 – *O. rohwedderi* sp. nov., PT 1/5 ♀; 9 – ditto, HT ♂; 10 – *O. sanguinea* sp. nov., PT 3/4 ♀; 11 – ditto, HT ♀; 12 – *O. schapinae* sp. nov., HT ♀; 13 – ditto, PT ♀; 14 – *O. stallei* sp. nov., HT ♂; 15 – *O. storozhenkoi* sp. nov., PT ♀; 16 – ditto, HT ♂; 17 – *O. subbrevicollis* sp. nov., PT 1/11 ♀; 18 – ditto, HT ♂; 19 – *O. telefominensis* sp. nov., HT ♂ [scale bars 1 cm].



Figures 1-18. Habitus of *Ophiotettix* species in dorsal view. 1 – *O. tenuis* sp. nov., paratype (PT) 1/3 ♀; 2 – ditto, holotype (HT) ♂; 3 – *O. toxopei* sp. nov., PT 3/11 ♀; 4 – ditto, HT ♂; 5 – *O. buergersi* Bolívar, 1929, PT ♀ labelled as allotype; 6 – ditto, HT ♂; 7 – *O. cygnicollis* Walker, 1871, HT ♀; 8 – ditto, ♂ syntype of *Tetricodina luteomarginata* Westwood, 1874; 9 – *O. limosina* (Snellen van Vollenhoven, 1865), paralectotype ♀; 10 – ditto, ♂ from Klamono, Doberai Peninsula, W New Guinea (not a type); 11 – *O. lorentzi* Bolívar, 1929, HT ♀; 12 – *O. modesta* Bolívar, 1929, PT ♀; 13 – ditto, HT ♂; 14 – ditto, ♀ from Regenberg, N New Guinea (not a type); 15 – *O. scolopax* Bolívar, 1929, HT ♀; 16 – ditto, PT ♂; 17 – *O. westwoodi* Bolívar, 1929 stat. rev., PT ♀ labelled as allotype; 18 – ditto, HT ♂ [scale bars 1 cm].



Figures 1-19. Habitus of *Ophiotettix* species in lateral view. 1 – *O. amberiana* sp. nov., holotype (HT) ♂; 2 – ditto, paratype (PT) 1/7 ♀; 3 – *O. bewana* sp. nov., HT ♀; 4 – *O. bomberaiensis* sp. nov., PT 20/27 ♀; 5 – ditto, HT ♂; 6 – *O. brevicollis* sp. nov., HT ♂; 7 – ditto, PT 13/41 ♀; 8 – *O. cheesmanae* sp. nov., HT ♀; 9 – *O. depressa* sp. nov., HT ♂; 10 – ditto, PT 1/4 ♀; 11 – *O. filiforma* sp. nov., PT 5/31 ♀; 12 – ditto, HT ♂; 13 – *O. flyriveriensis* sp. nov., PT 21/24 ♀; 14 – ditto, HT ♂, 15 – *O. fritzpahli* sp. nov., HT ♂; 16 – ditto, PT 1/18 ♀; 17 – *O. hansscholteni* sp. nov., PT 1/3 ♀; 18 – ditto, HT ♂; 19 – *O. imbiana* sp. nov., HT ♂ [scale bars 1 cm].



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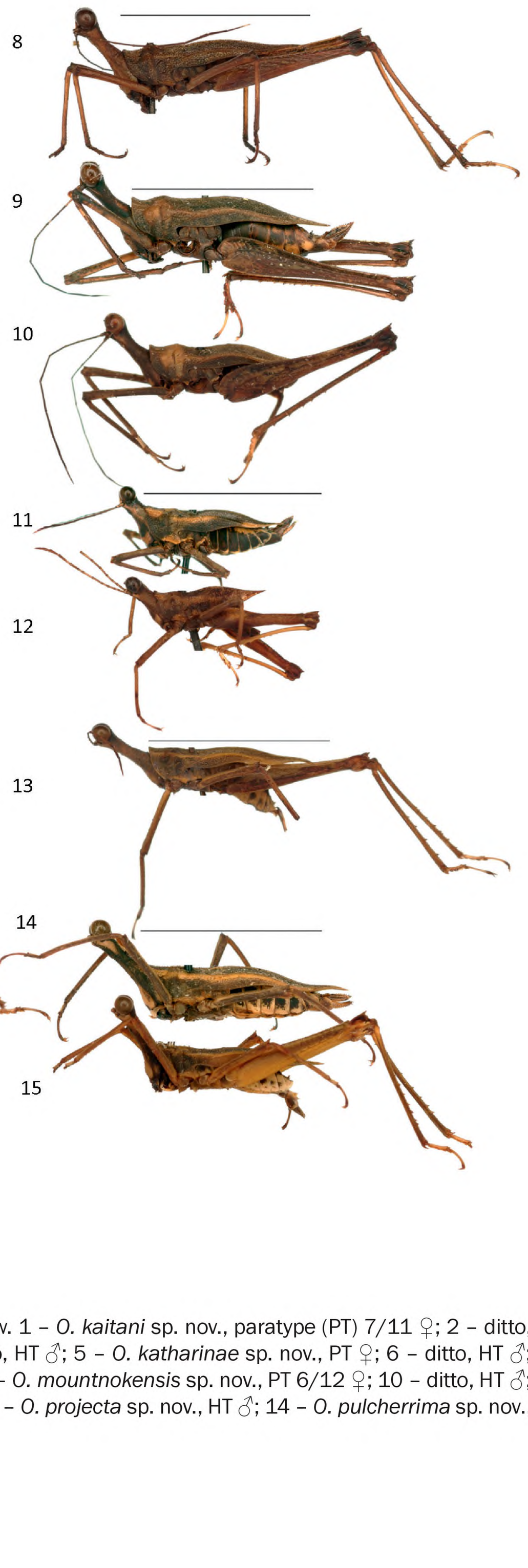
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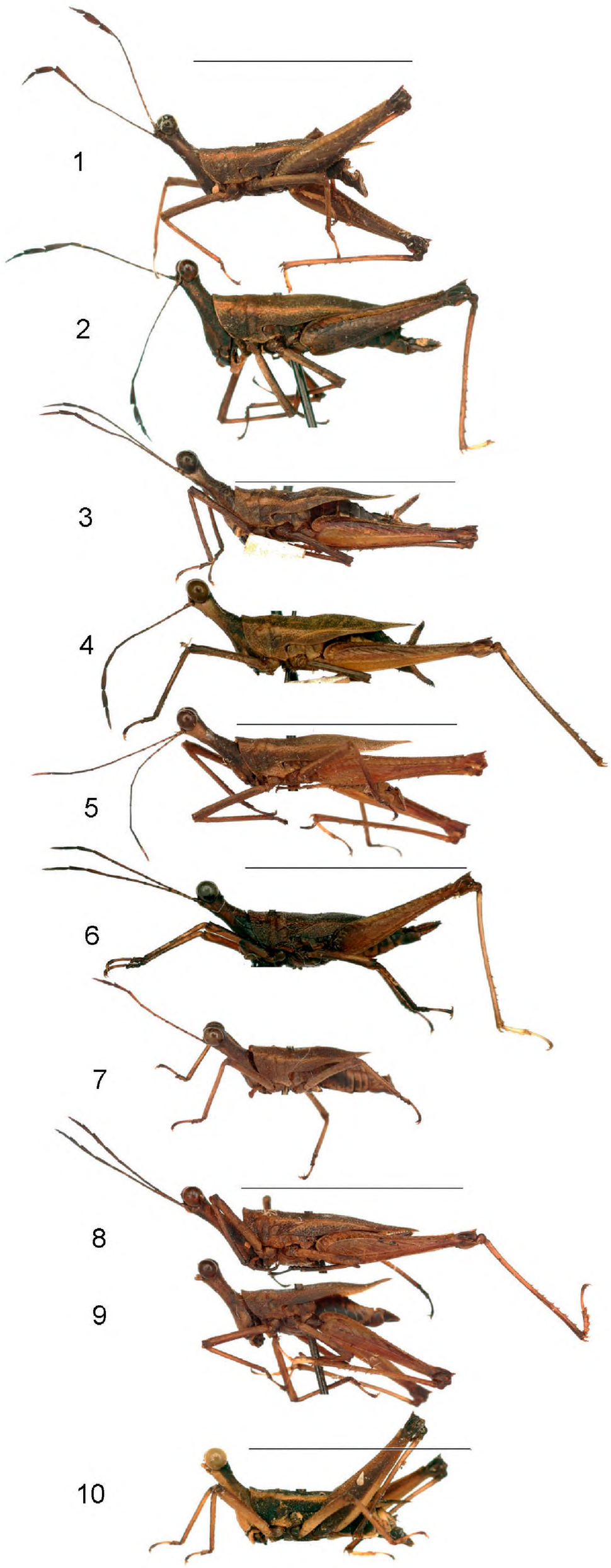
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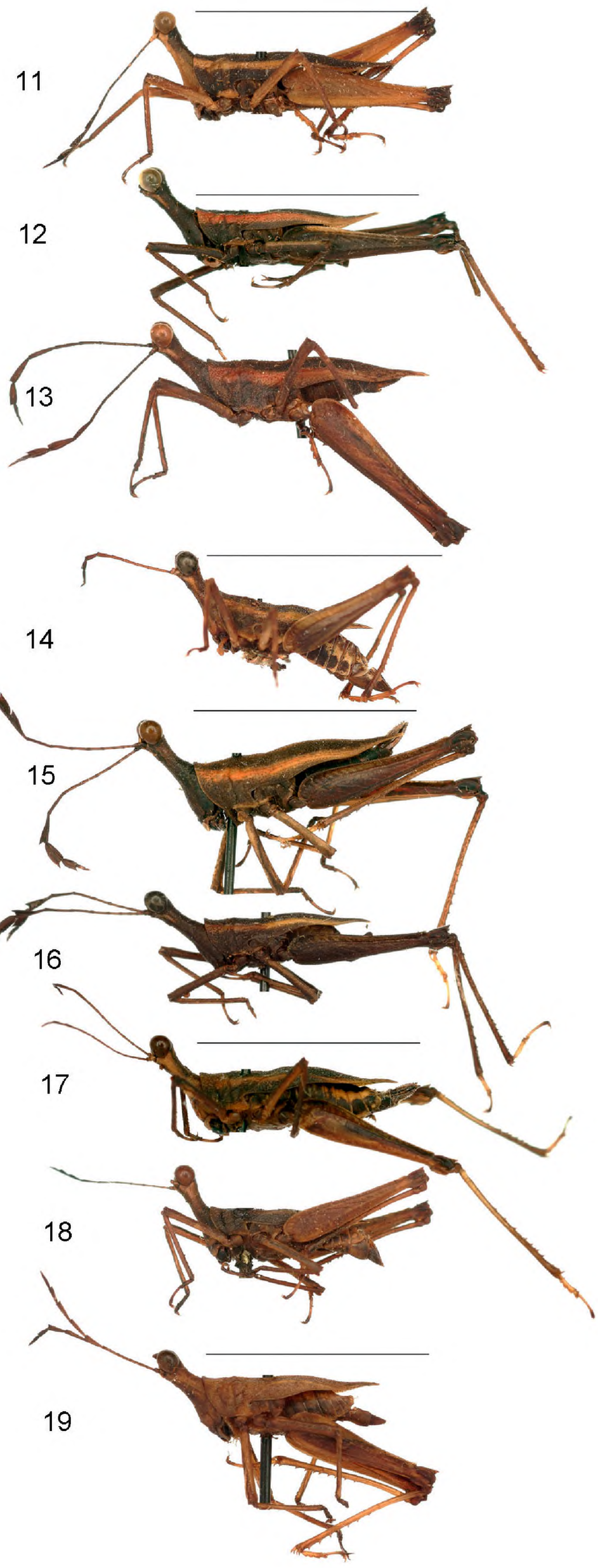
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Figures 1-15. Habitus of *Ophiotettix* species in lateral view. 1 – *O. kaitani* sp. nov., paratype (PT) 7/11 ♀; 2 – ditto, HT ♂; 3 – *O. karimuiensis* sp. nov., PT 13/22 ♀; 4 – ditto, HT ♂; 5 – *O. katharinae* sp. nov., PT ♀; 6 – ditto, HT ♂; 7 – *O. luce* sp. nov., HT ♀; 8 – *O. meggy* sp. nov., HT ♀; 9 – *O. mountnokensis* sp. nov., PT 6/12 ♀; 10 – ditto, HT ♂; 11 – *O. parvicollis* sp. nov., PT 5/5 ♀; 12 – ditto, HT ♂; 13 – *O. projecta* sp. nov., HT ♂; 14 – *O. pulcherrima* sp. nov., PT 3/8 ♀; 15 – ditto, PT 7/8 ♂ [scale bars 1 cm].

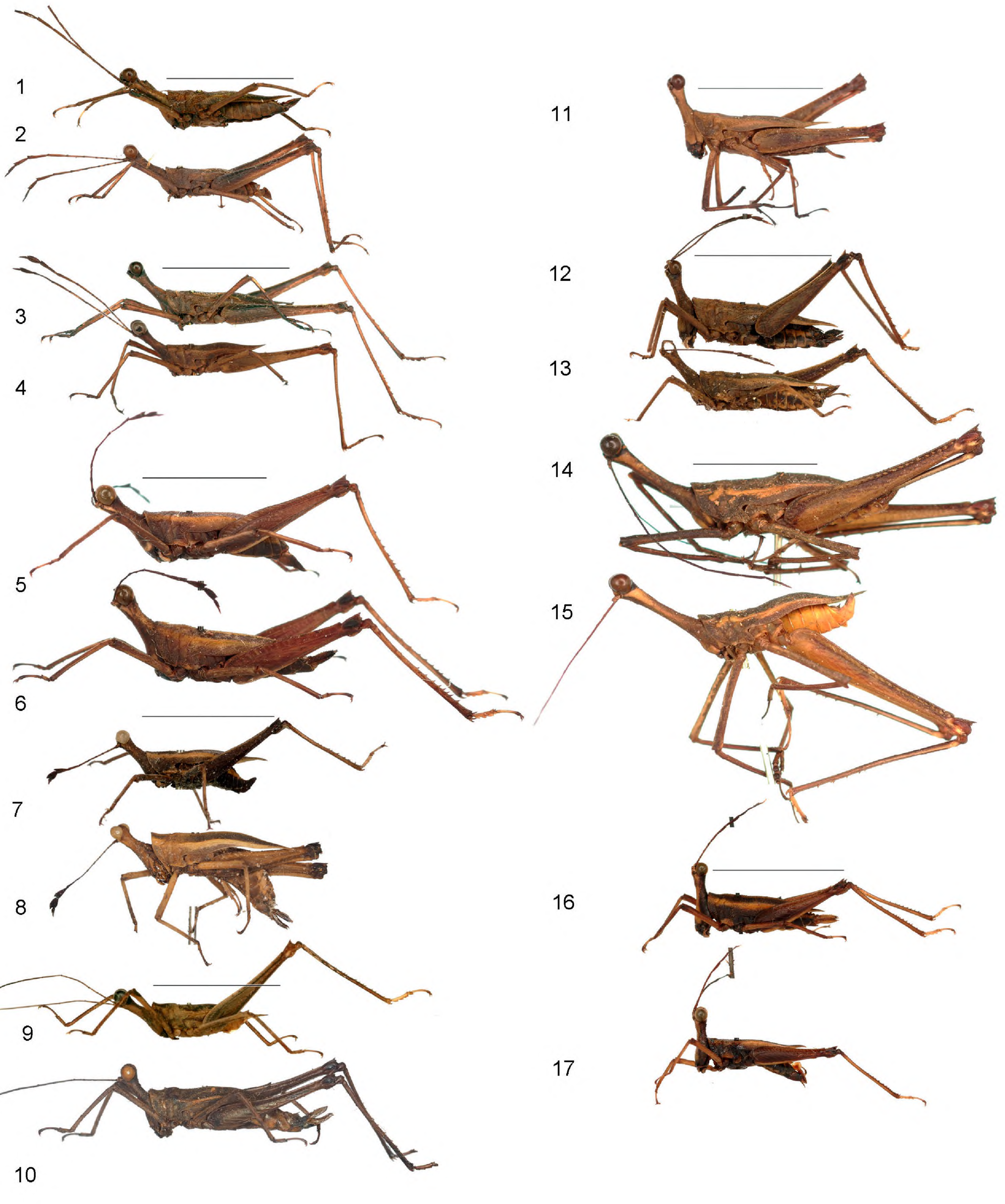
Plate 119

TUMBRINCK, J. & SKEJO, J.: Taxonomic and biogeographic revision of the New Guinean genus *Ophiotettix* Walker, 1871 ...





Figures 1-19. Habitus of *Ophiotettix* species in lateral view. 1 – *O. pushkari* sp. nov., holotype (HT) ♂; 2 – ditto, PT ♀; 3 – *O. quateorum* sp. nov., HT ♀; 4 – ditto, PT 1/8 ♀; 5 – *O. rebrinae* sp. nov., HT ♂; 6 – *O. roesleri* sp. nov., PT 1/18 ♀; 7 – ditto, HT ♂; 8 – *O. rohwedderi* sp. nov., PT 1/5 ♀; 9 – ditto, HT ♂; 10 – *O. sanguinea* sp. nov., HT ♀; 11 – ditto, PT 3/4 ♀; 12 – *O. schapinae* sp. nov., PT ♀; 13 – ditto, HT ♀; 14 – *O. stallei* sp. nov., HT ♂; 15 – *O. storozhenkoi* sp. nov., PT ♀; 16 – ditto, HT ♂; 17 – *O. subbrevicollis* sp. nov., PT 1/11 ♀; 18 – ditto, HT ♂; 19 – *O. telefominensis* sp. nov., HT ♂ [scale bar 1 cm].



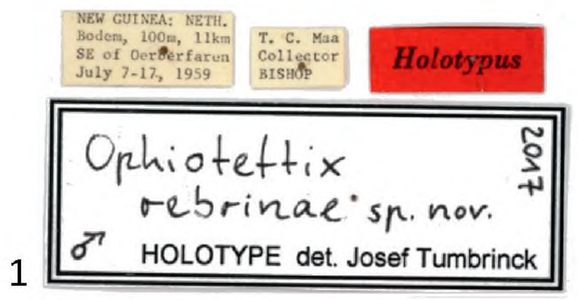
Figures 1-17. Habitus of *Ophiotettix* species in lateral view. 1 – *O. tenuis* sp. nov., paratype (PT) 1/3 ♀; 2 – ditto, holotype (HT) ♂; 3 – *O. toxopei* sp. nov., PT 3/11 ♀; 4 – ditto, HT ♂; 5 – *O. buergersi* Bolívar, 1929, HT ♂; 6 – ditto, PT ♀ labelled as allotype; 7 – *O. cygnicollis* Walker, 1871, ♂ syntype of *Tetricodina luteomarginata* Westwood, 1874; 8 – ditto, HT ♀; 9 – *O. limosina* (Snellen van Vollenhoven, 1865), ♂ from Klamono, Doberai Peninsula, W New Guinea (not a type); 10 – ditto, paralectotype ♀; 11 – *O. lorentzi* Bolívar, 1929, HT ♀; 12 – *O. modesta* Bolívar, 1929, PT ♀; 13 – ditto, PT ♀ labelled as allotype; 14 – *O. scolopax* Bolívar, 1929, HT ♀; 15 – ditto, PT ♂; 16 – *O. westwoodi* Bolívar, 1929 stat. rev., PT ♀ labelled as allotype; 17 – ditto, HT ♂ [scale bars 1 cm].

Plate 121



Figures 1-21. Holotype labels of new *Ophiotettix* species 1 – *O. amberiana* sp. nov.; 2 – *O. bewana* sp. nov.; 3 – *O. bomberaiensis* sp. nov.; 4 – *O. brevicollis* sp. nov.; 5 – *O. cheesmanae* sp. nov.; 6 – *O. depressa* sp. nov.; 7 – *O. filiforma* sp. nov.; 8 – *O. flyriveriensis* sp. nov.; 9 – *O. fritzpahli* sp. nov.; 10 – *O. hansscholteni* sp. nov.; 11 – *O. imbiana* sp. nov.; 12 – *O. kaitani* sp. nov.; 13 – *O. karimuiensis* sp. nov.; 14 – *O. katharinae* sp. nov.: 15 – *O. luce* sp. nov.; 16 – *O. meggy* sp. nov.; 17 – *O. mountnokensis* sp. nov.; 18 – *O. parvicollis* sp. nov.; 19 – *O. projecta* sp. nov.; 20 – *O. pulcherrima* sp. nov.; 21 – *O. pushkari* sp. nov.

Plate 122



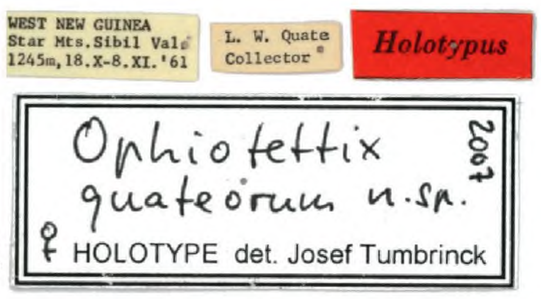
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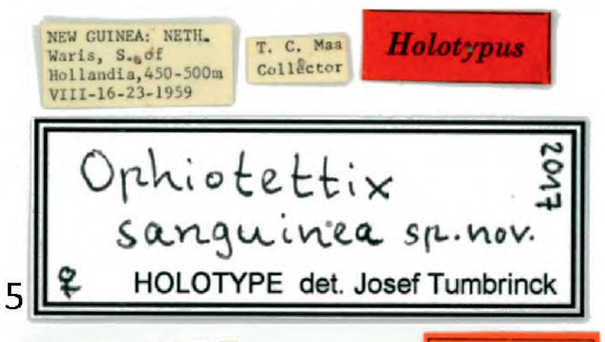
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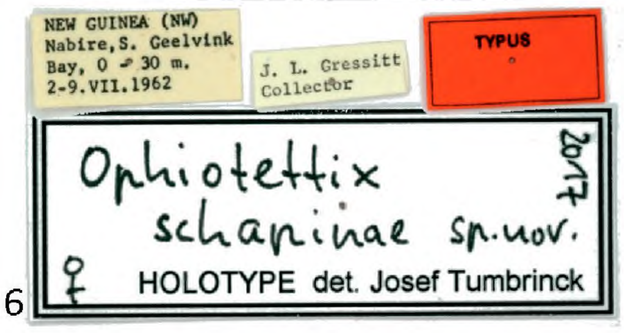
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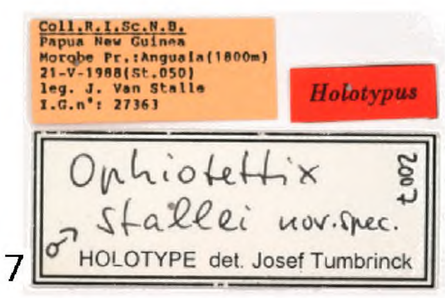
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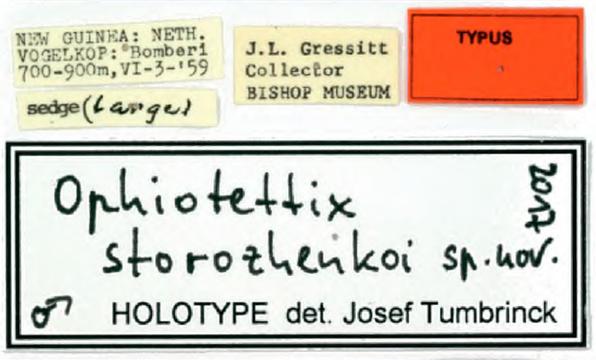
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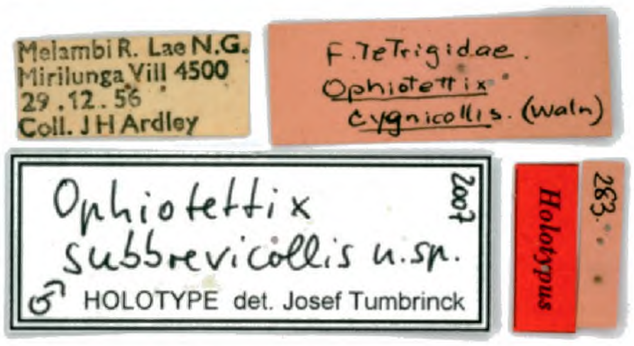
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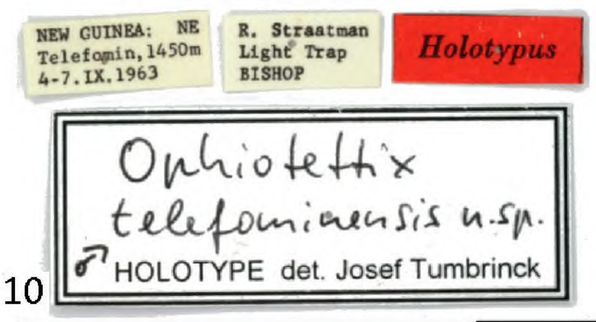
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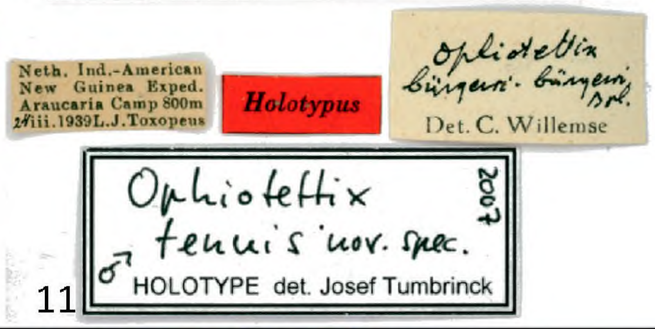
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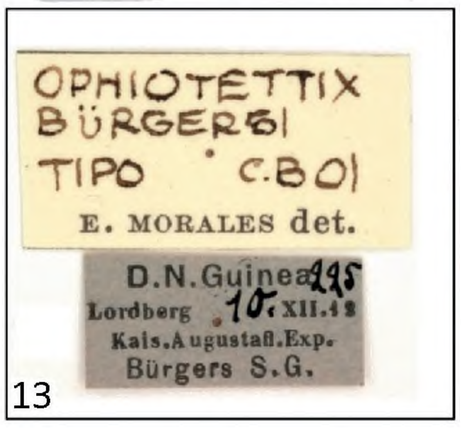
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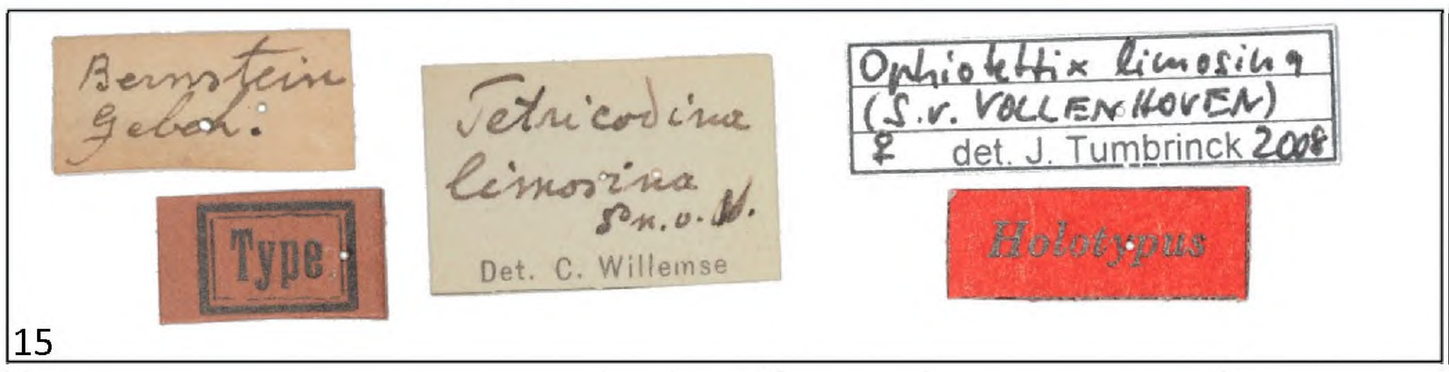
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Figures 1-19. Type labels of new and hitherto described *Ophiotettix* species. 1 – *O. rebrinae* sp. nov.; 2 – *O. roesleri* sp. nov.; 3 – *O. rohwedderi* sp. nov.; 4 – *O. quateorum* sp. nov.; 5 – *O. sanguinea* sp. nov.; 6 – *O. schapinae* sp. nov.; 7 – *O. stallei* sp. nov.; 8 – *O. storozhenkoi* sp. nov.; 9 – *O. subbrevicollis* sp. nov.; 10 – *O. telefominensis* sp. nov.; 11 – *O. tenuis* sp. nov.; 12 – *O. toxopei* sp. nov.; 13 – *O. buergersi* Bolívar, 1929; 14 – *O. cygnicollis* Walker, 1871, holotype and syntype *Tetricodina luteomarginata* Westwood, 1874 syn. acc.; 15 – *Tetrix limosina* Snellen van Vollenhoven, 1865, lectotype; 16 – *O. lorentzi* Bolívar, 1929, holotype; 17 – *O. modesta* Bolívar, 1929, holotype; 18 – *O. scolopax* Bolívar, 1929, holotype; 19 – *O. westwoodi* Bolívar, 1929, holotype.





Figures 1-5. Field photographic records of living *Ophiotettix*. 1 – *O. pulcherrima* sp. nov. mating pair from Yapen Island, Cenderawasih Bay, W New Guinea, lateral view (photo: D. Price); 2 – ♀ of undescribed pygmy giraffehopper species from Muller Range, Papua New Guinea, Southern Highlands Province, dorsal view (photo: P. Naskrecki); 3 – *O. pulcherrima* sp. nov. maiting pair from Yapen Island, Cenderawasih Bay, W New Guinea, lateral view (photo: D. Price); 4 – ditto, frontal view (photo: D. Price); 5 – ♀ of undescribed giraffehopper from Muller Range, Papua New Guinea, Southern Highlands Province, lateral view (photo: P. Naskrecki). All photographs reproduced with permission.











Figures 1-5. Field photographic records of living *Ophiotettix*. 1 – *O. storozhenkoi* sp. nov., ♀ from Fak Fak Mts., Onin Peninsula, W New Guinea, on bark and bearing photosynthetic organisms on its pronotum (likely epizoic interaction, symbiosis), lateral view (photo: D. Telnov); 2 – ditto, on a leaf, lateral view (photo: D. Telnov); 3 – *O. limosina* (Snellen van Vollenhoven, 1865) ♂ from Arfak Mts., Doberai Peninsula, W New Guinea (photo: M. Stefunko); 4-5 – *O. filiforma* sp. nov., ♂ from Kali Biru, N New Guinea, on a leaf, dorsolateral view (photos: D. Price). All photographs reproduced with permission.

Plate 125

VITALI, F.: Taxonomic notes on *Acalolepta mixta* (Hope, 1841) and *Acalolepta vastator* (Newman, 1847) ...



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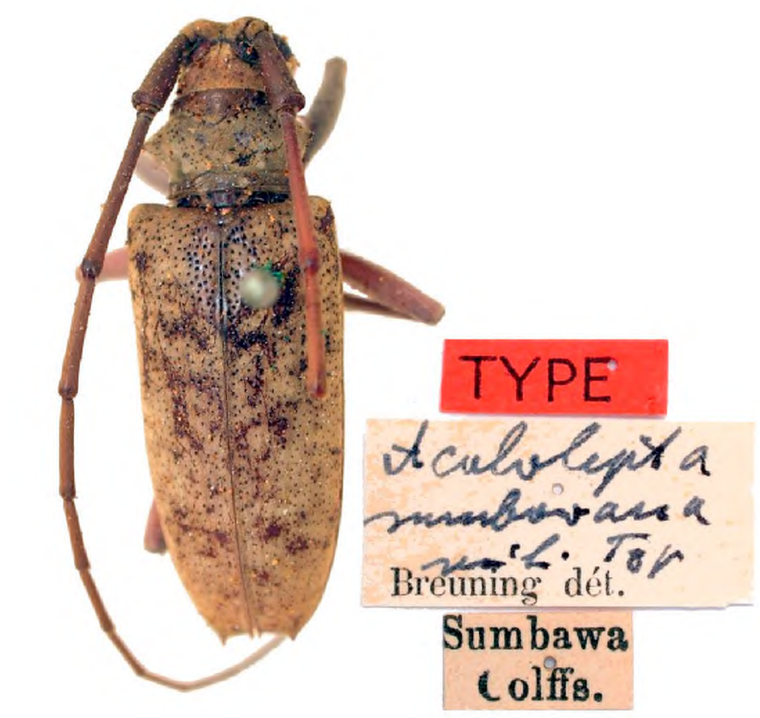
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Figures 1-7. *Acalolepta mixta* (Hope, 1841), habitus and original labels. 1 – *Monochammus mixtus* Hope, 1841, syntype ♂, habitus, dorsal view; 2 – ditto, ventral view; 3 – *Dihammus bispinosus* Breuning, 1935, holotype ♂; 4 – *Acalolepta bispinosipennis* Breuning, 1969, holotype ♀; 5 – *A. sumbawana* Breuning, 1969, holotype ♀; 6 – *A. savoensis* Breuning, 1979, holotype ♂; 7 – *A. mixta* (Hope, 1841), ♀ from Bellona Island, Solomon Islands.

Plate 126

DE VOS, R.: The *Cyana* Walker, 1854 species of New Guinea, with description of a new subgenus ...

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Figures 1-4. Papuan *Cyana (Cyana)* species. 1-2 – *C. (C.) transfasciata* (Rothschild, 1912): 1 – Lectotype ♂, Utakwa River, Papua, Indonesia (BMNH); 2 – ♀ Setekwa River, Papua, Indonesia (BMNH); 3-4 – *C. (C.). binigrofasciata* spec. nov.: 3 – Holotype ♂, Marina Valen, Papua, Indonesia (KSP); 4 – Paratype ♂, Marina Valen, Papua, Indonesia (RMNH).

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Figures 5-8. Papuan *Cyana (Clerckia)* species. 5-6 – *C. (Cl.) metamelas* (Hampson, 1914): 5 – Holotype ♂, Mimika River, Papua, Indonesia (BMNH); 6 – ♀ (presumed to belong to *C. metamelas*) Wangaar, Papua, Indonesia (BMNH); 7 – *C. (Cl.) posthyalina* sp. nov., holotype ♂, Batanta Island, Papua Barat, Indonesia (RMNH); 8 – *C. (Cl.) dentimarginata* spec. nov., holotype ♂, Andai, Papua Barat, Indonesia (RMNH).

Plate 127

DE VOS, R.: The *Cyana* Walker, 1854 species of New Guinea, with description of a new subgenus ...



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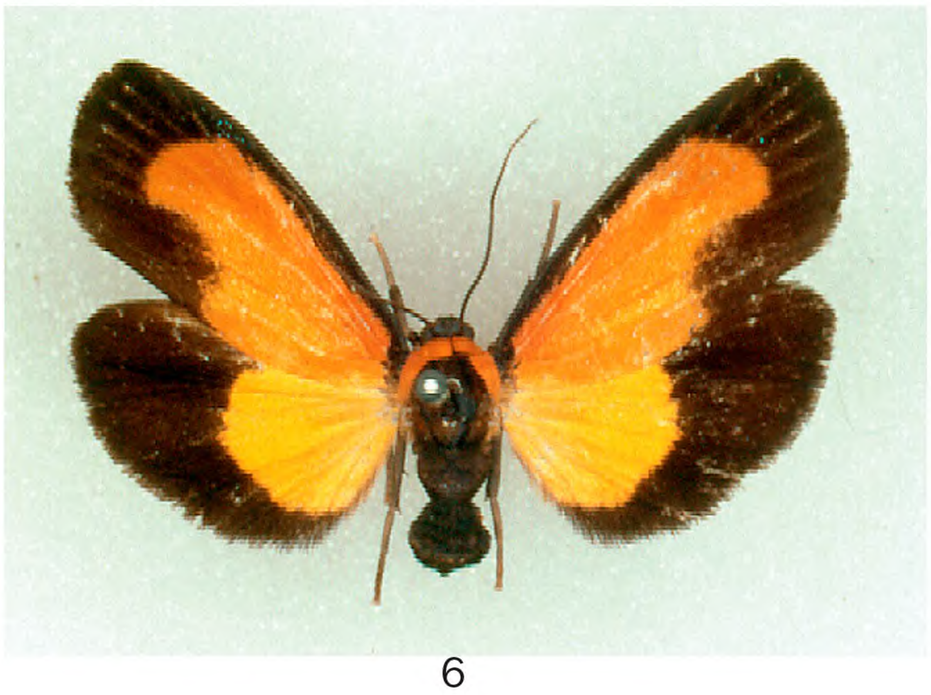
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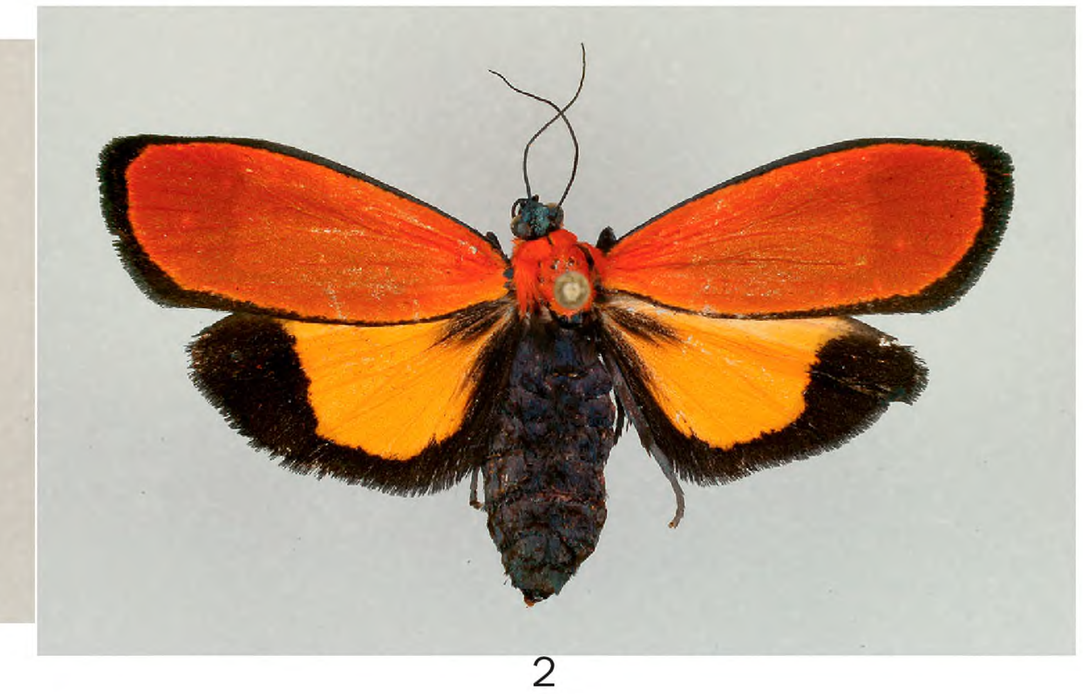
Figures 1-8. Papuan *Cyana (Clerckia)* species. 1-2 – *C. (Cl.) tegyra tegyra* (Druce, 1899): 1 – Holotype ♂, Fergusson Island, Papua New Guinea (BMNH); 2 – ♀ from Goodenough Island, Papua New Guinea (BMNH); 3-4 – *C. (Cl.) tegyra postdivisa* (Rothschild, 1913): 3 – ♂ from Gn. Meja Reserve, Manokwari, Papua Barat, Indonesia (RMNH); 4– ♀ from Numfor Island, Papua, Indonesia (BMNH); 5-6 – *C. (Cl.) tegyra retracta* (Draudt, 1914): 5 – Holotype ♂, New Britain, Papua New Guinea (BMNH); 6 – ♀ from New Ireland, Papua New Guinea (BMNH); 7-8 – *C. (Cl.) tricolora* (Butler, 1877): 7 – ♂ from Mabilabol, Star Mts, Papua, Indonesia (RMNH); 8 – Holotype ♀, Aru Islands, Indonesia (BMNH).

Plate 128

DE VOS, R.: The *Cyana* Walker, 1854 species of New Guinea, with description of a new subgenus ...



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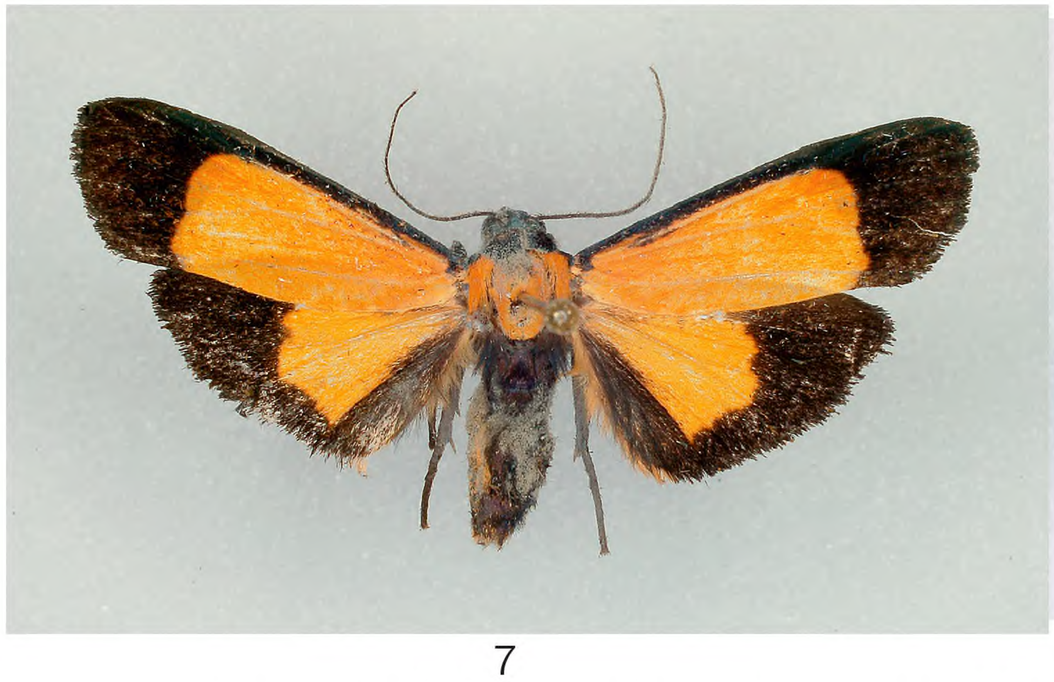
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Figures 1-8. Papuan *Cyana (Clerckia)* species. 1-2 – *C. (Cl.) trigona* Rothschild, 1903: 1 – ♂ from Walmak, Jayawijaya Mts, Papua, Indonesia (RMNH); 2 – ♀ from Walmak, Jayawijaya Mts, Papua, Indonesia (RMNH); 3-4 – *C. (Cl.) simonthomasi* sp. nov.: 3 – Holotype ♂, Kota Nica, Papua, Indonesia (RMNH); 4 – Paratype ♀, Genjem, Papua, Indonesia (RMNH); 5-8 – *C. (Cl.) thoracica* Rothschild, Jordan, 1901: 5 – Lectotype ♂, Humboldt Bay, Papua, Indonesia (BMNH); 6 – ♂ from Rasiei, Wandammen Peninsula, Papua Barat, Indonesia (RMNH); 7 – ♂ from Dotir, Wandammen Peninsula, Papua Barat, Indonesia (RMNH); 8 – ♀ from Landikma, Jayawijaya Mts, Papua, Indonesia (RMNH).

Plate 129

DE VOS, R.: The *Cyana* Walker, 1854 species of New Guinea, with description of a new subgenus ...



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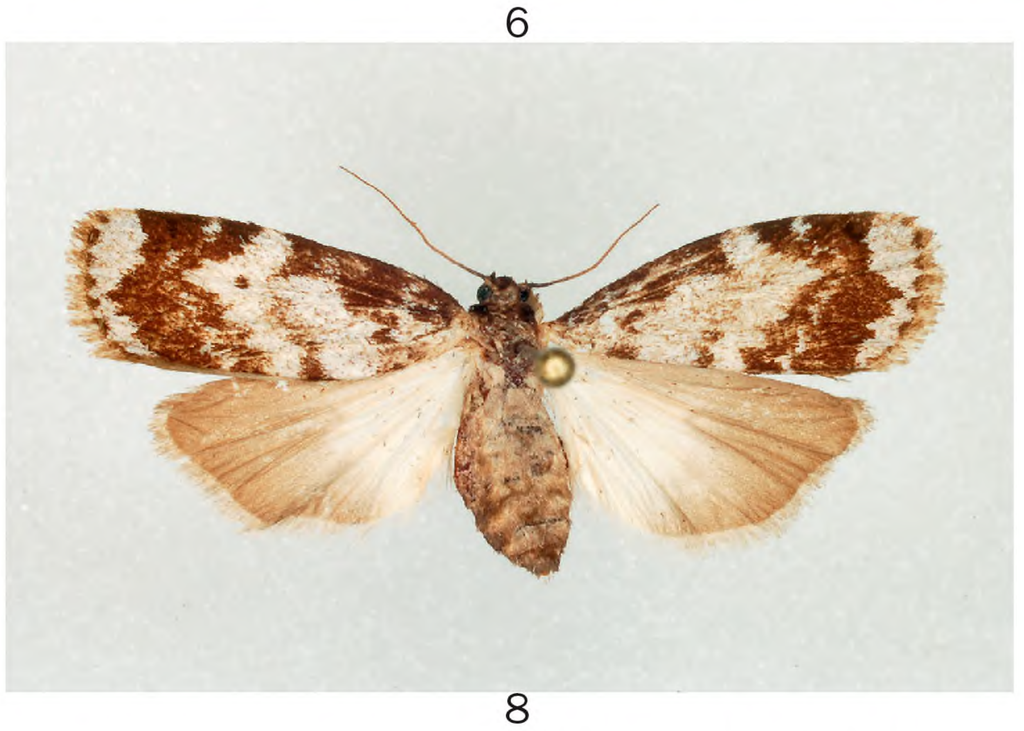
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Figures 1-8. Papuan *Cyana* species. 1-2 – *C. (Clerkia) thoracica* Rothschild, Jordan, 1901: 1 – ♀ from Etna Bay, Papua, Indonesia (RMNH); 2 – Holotype ♀ *Chionaema croceizona*, Wataikwa River, Papua, Indonesia (BMNH–1689257); 3-4 – *C. (Cryptanaema) nigroplagata* (Bethune-Baker, 1910): 3 – ♂ from Pass Valley, Jayawijaya Mts, Papua, Indonesia (RMNH); 4 – ♀ from Walmak, Jayawijaya Mts, Papua, Indonesia (RMNH); 5 – *C. (Cr.) albimarginalis* sp. nov. holotype ♂, Mokndoma, Sudirman Mts, Papua, Indonesia (KSP– 65627); 6-7 – *C. (Cr.) basialba* (Rothschild, 1913): 6 – ♂ from Wondiboy Mts, Wandammen Peninsula, Papua Barat, Indonesia (KSP–24243); 7 – ♀ from Mabilabol, Star Mts, Papua, Indonesia (RMNH); 8 – *C. (Cr.) molbakon* sp. nov. holotype ♀, Molbakon, Star Mts, Papua, Indonesia (RMNH).

Plate 130

DE VOS, R.: The *Cyana* Walker, 1854 species of New Guinea, with description of a new subgenus ...



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Figures 1-8. Papuan *Cyana (Cryptanaema)* species. 1-3 – *C. (Cr.) inusitata* (Bethune-Baker, 1910): 1 – ♂ from Lelambo, Jayawijaya Mts, Papua, Indonesia (RMNH); 2 – ♀ from Mabilabol, Star Mts, Papua, Indonesia (RMNH); 3 – ♀ dark form, Senopi, Tamrau Plateau, Papua Barat, Indonesia (RMNH); 4-6 – *C. (Cr.) zwieri* sp. nov.: 4 – Holotype ♂, Walmak, Jayawijaya Mts, Papua, Indonesia (RMNH); 5 – Paratype ♀, Walmak, Jayawijaya Mts, Papua, Indonesia (RMNH); 6 – ♀ dark form, Walmak, Jayawijaya Mts, Papua, Indonesia (RMNH); 7-8 – *C. (Cr.) melanoplagia melanoplagia* (Hampson, 1900): 7 – ♂ from Mabilabol, Star Mts, Papua, Indonesia (RMNH); 8 – ♀ from Warkapi, Arfak Mts, Papua Barat, Indonesia (RMNH).

Plate 131

DE VOS, R.: The *Cyana* Walker, 1854 species of New Guinea, with description of a new subgenus ...



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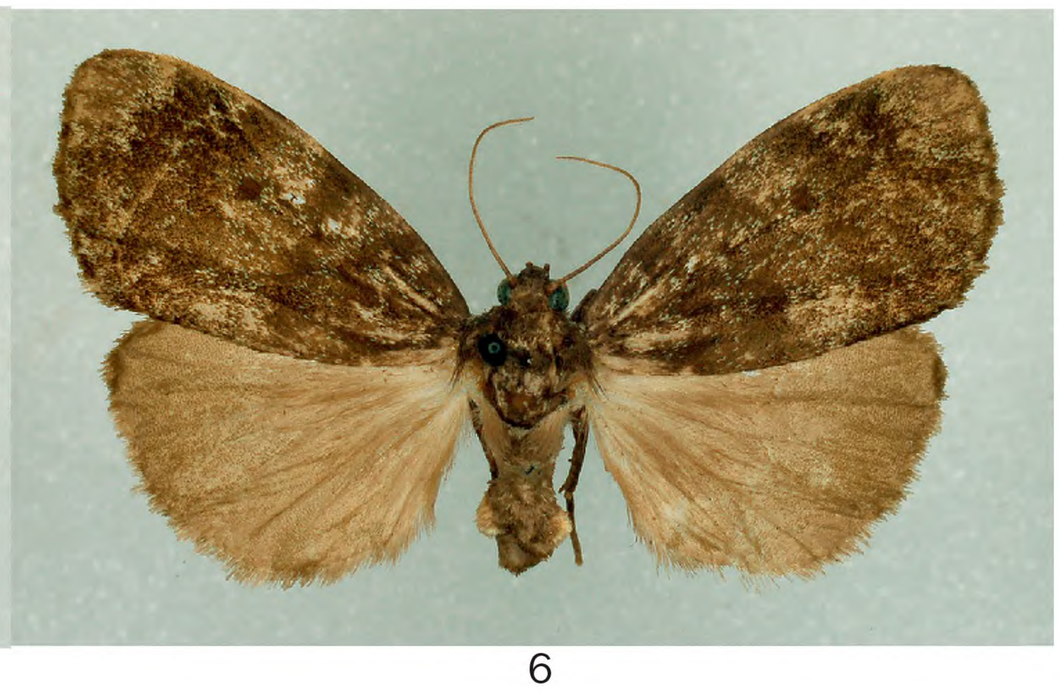
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Figures 1-8. Papuan *Cyana (Cryptanaema)* species. 1-2 – *C. (Cr.) melanoplagia orcheia* (Rothschild, 1916): 1 – Lectotype ♂, Dampier Island [Karkar], Papua New Guinea (BMNH); 2 – ♀ from Dampier Island (= former Karkar), Papua New Guinea (BMNH); 3-4 – *C. (Cr.) melanoplagia extrema* ssp. nov.: 3 – Holotype ♂, Goodenough Island, Papua New Guinea (BMNH); 4 – Paratype ♀, Goodenough Island, Papua New Guinea (BMNH); 5-6 – *C. (Cr.) aroa* (Bethune-Baker, 1904): 5 – Holotype ♂, Upper Aroa River, Papua New Guinea (BMNH); 6 – ♀ from Upper Aroa River, Papua New Guinea (BMNH); 7-8 – *C. (Cr.) charybdis* (Bethune-Baker, 1904): 7 – ♂ from Walmak, Jayawijaya Mts, Papua, Indonesia (RMNH); 8 – ♀ from Mokwam, Arfak Mts, Papua Barat, Indonesia (RMNH).

Plate 132

DE VOS, R.: The *Cyana* Walker, 1854 species of New Guinea, with description of a new subgenus ...



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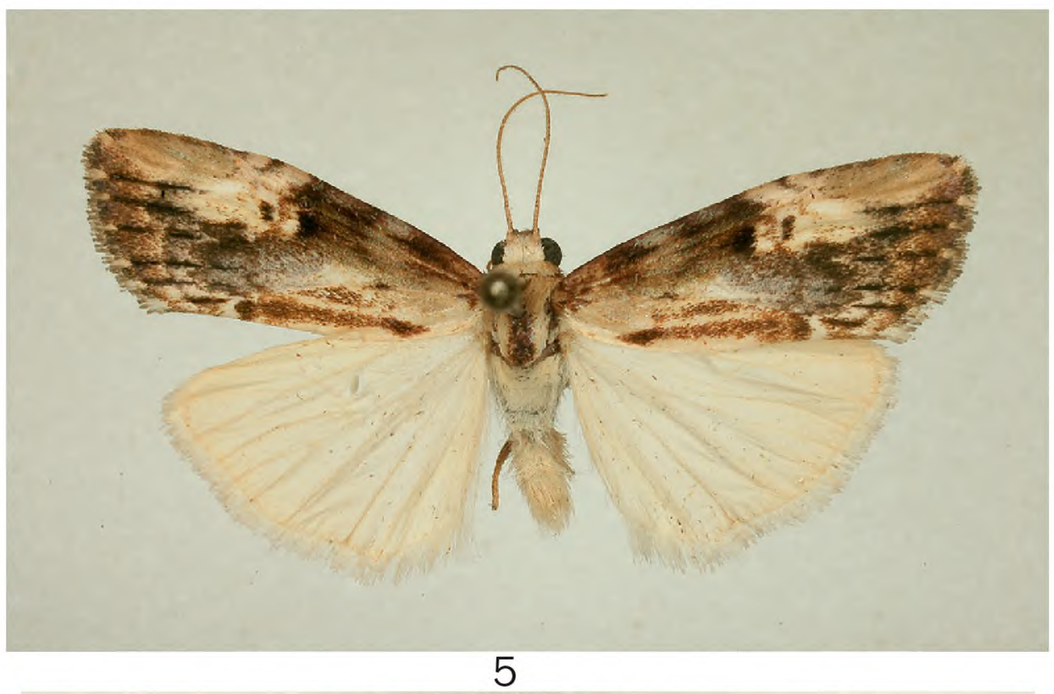
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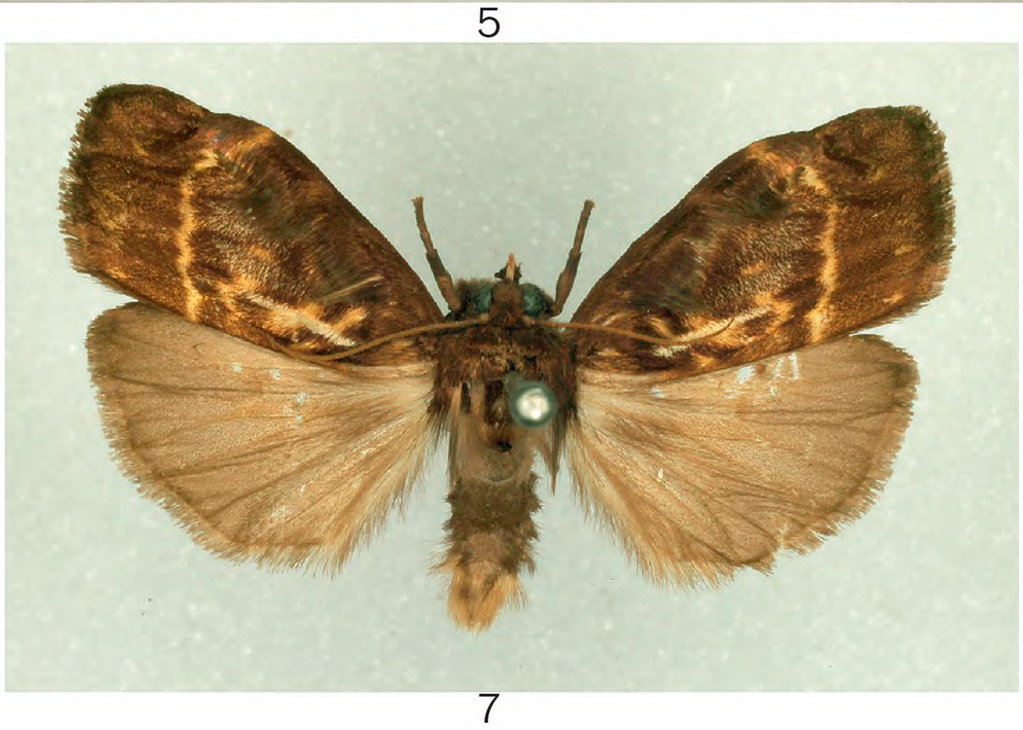
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Figures 1-8. Papuan *Cyana (Cryptanaema)* species. 1-2 – *C. (Cr.) fumea* (Hampson, 1900): 1 – ♂ from Prafi, Birdshead Peninsula, Papua Barat, Indonesia (RMNH); 2 – ♀ from Warkapi, Arfak Mts, Papua Barat, Indonesia (RMNH); 3-4 – *C. (Cr.) punctistrigosa* (Rothschild, 1913): 3 – ♂ from Dotir, Wandammen Peninsula, Papua Barat, Indonesia (RMNH); 4 – ♀ from Mt. Goliath (Gn. Yamin), Star Mts., Papua, Indonesia (BMNH); 5-6 – *C. (Cr.) gracilis* sp. nov.: 5 – Holotype ♂, Foja Mts, Papua (KSP–42271); 6 – Paratype ♀, Foja Mts, Papua (KSP–42284); 7-8 – *C. (Cr.) brunnea* (Bethune-Baker, 1904): 7 – ♂ from Hydrographer Mts, Papua New Guinea (BMNH); 8 – ♀ from Fakfak, Papua Barat, Indonesia (BMNH).

Plate 133

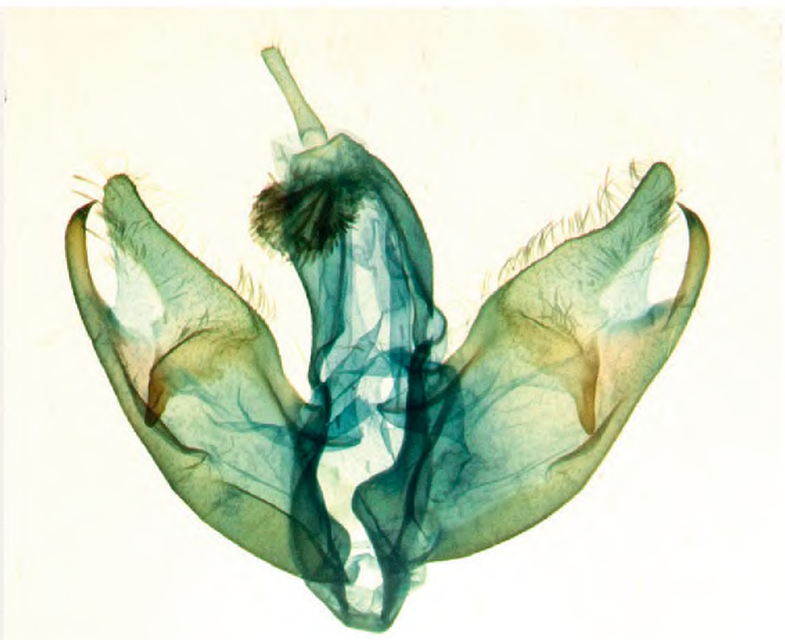
DE VOS, R.: The *Cyana* Walker, 1854 species of New Guinea, with description of a new subgenus ...



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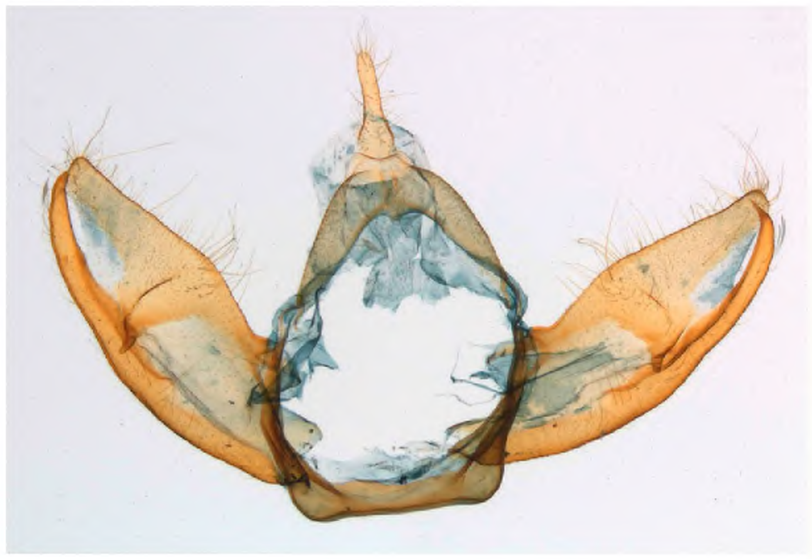


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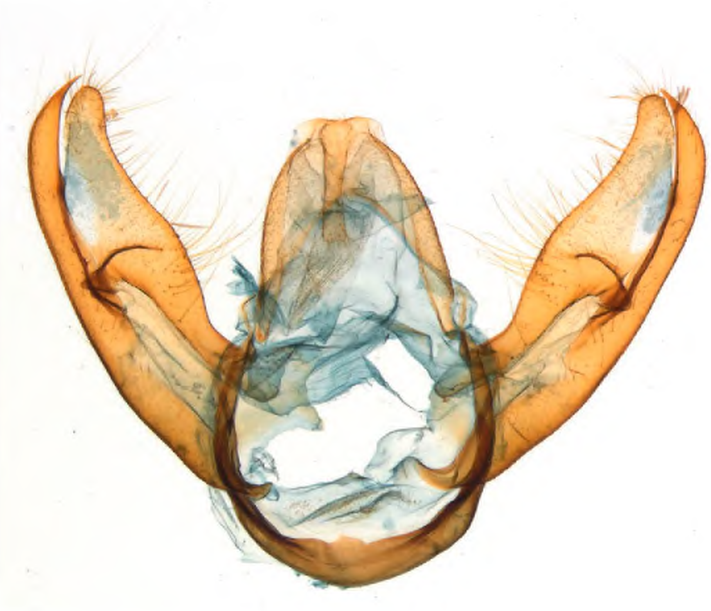
Figures 1-8. Male genitalia of *Cyana* species. 1-2 – *Cyana (Cyana) transfasciata* (Rothschild, 1912) prep. BM–RV1528: 1 – Habitus genitalia; 2 – Aedeagus; 3-4 – *C. (C.). binigrofasciata* sp. nov. prep. KSP–24241: 3 – Habitus genitalia; 4 – Aedeagus; 5-6 – *C. (Clerckia) metamelas* (Hampson, 1914) prep. NHMUK_010313308: 5 – Habitus genitalia; 6 – Aedeagus; 7-8 – *C. (Cl.) posthyalina* sp. nov. prep. RV1544: 7 – Habitus genitalia; 8 – aedeagus.

Plate 134

DE VOS, R.: The *Cyana* Walker, 1854 species of New Guinea, with description of a new subgenus ...



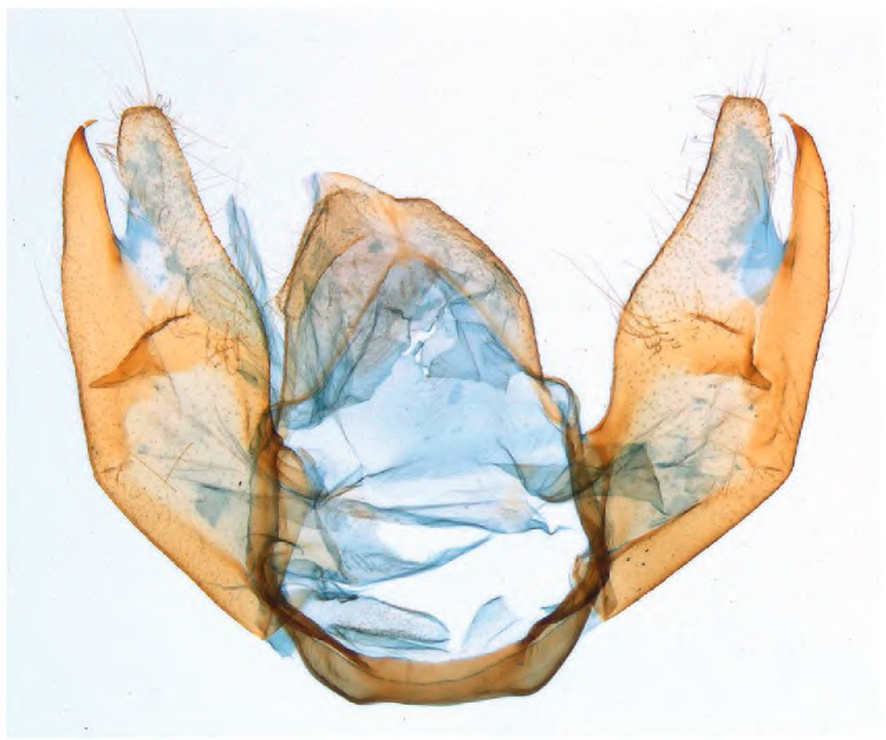
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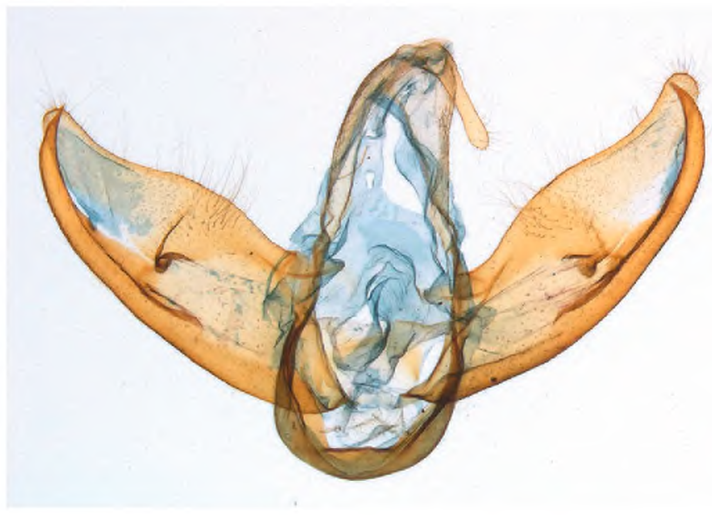


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Figures 1-8. Male genitalia of *Cyana (Clerckia)* species. 1-2 – *C. (Cl.) dentimarginata* sp. nov. prep. RV1549: 1 – Habitus genitalia; 2 – Aedeagus; 3-4 – *C. (Cl.) tegyra tegyra* (Druce, 1899) prep. BM–RV1545: 3 – Habitus genitalia; 4 – Aedeagus; 5-6 – *C. (Cl.) tegyra postdivisa* (Rothschild, 1913) prep. RV1546: 5 – Habitus genitalia; 6 – Aedeagus; 7-8 – *C. (Cl.) tricolora* (Butler, 1877) prep. RV1559: 7 – Habitus genitalia; 8 – Aedeagus.

Plate 135

DE VOS, R.: The *Cyana* Walker, 1854 species of New Guinea, with description of a new subgenus ...



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Figures 1-8. Male genitalia of *Cyana* species. 1-2 – *C. (Clerckia) trigona* Rothschild, 1903 prep. RV1557: 1 – Habitus genitalia; 2 – Aedeagus; 3-4 – *C. (Cl.) simonthomasi* sp. nov. prep. RV1550: 3 – Habitus genitalia; 4 – Aedeagus; 5-6 – *C. (Cl.) thoracica* Rothschild, Jordan, 1901 prep. RV1555: 5 – Habitus genitalia; 6 – Aedeagus; 7-8 – *Cyana (Cryptanaema) nigroplagata* (Bethune-Baker, 1910) prep. RV1530: 7 – Habitus genitalia; 8 – Aedeagus.

Plate 136

DE VOS, R.: The *Cyana* Walker, 1854 species of New Guinea, with description of a new subgenus ...



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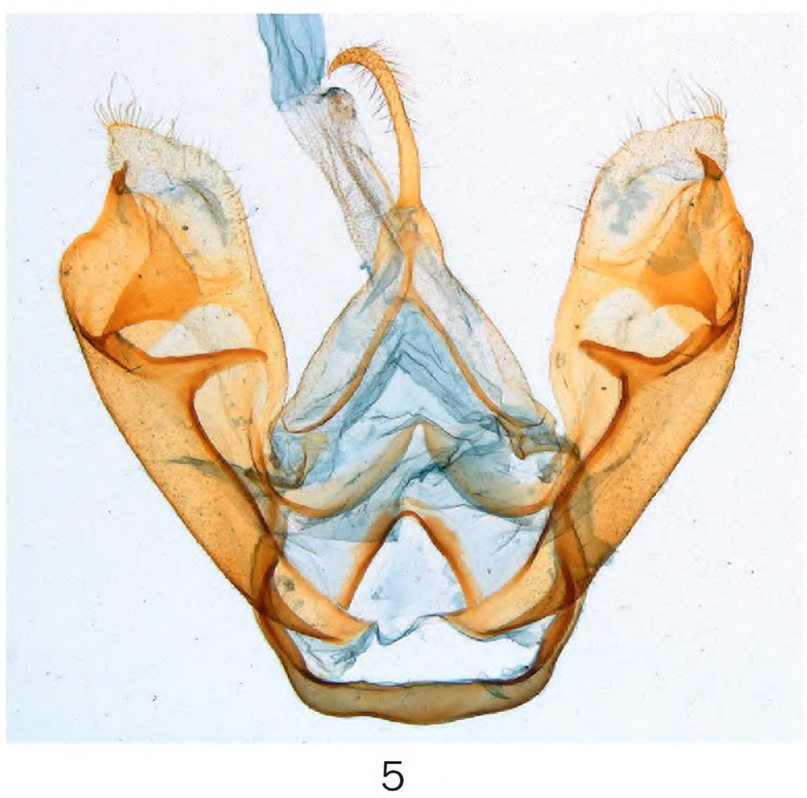
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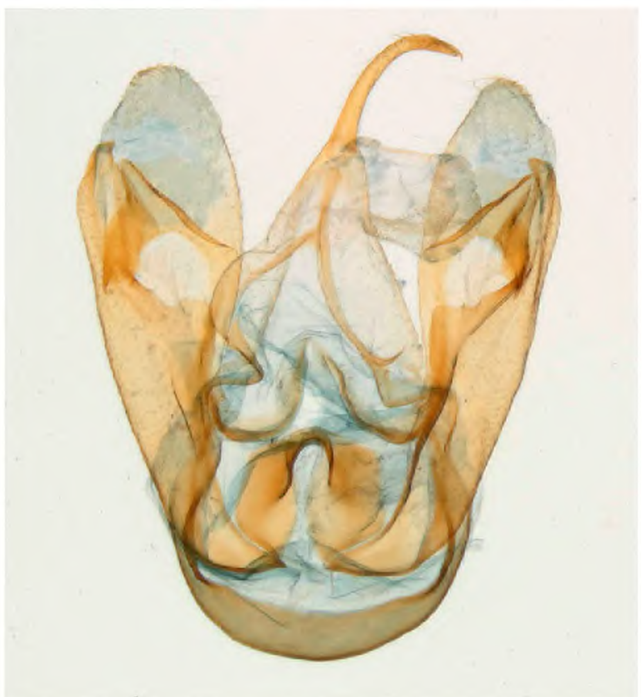


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Figures 1-8. Male genitalia of *Cyana (Cryptanaema)* species. 1-2 – *C. (Cr.) albimarginalis* sp. nov. prep. KSP–65627: 1 – Habitus genitalia; 2 – Aedeagus; 3-4 – *C. (Cr.) basialba* (Rothschild, 1913) prep. KSP–24243: 3 – Habitus genitalia; 4 – Aedeagus; 5-6 – *C. (Cr.) inusitata* (Bethune-Baker, 1910) prep. RV1538: 5 – Habitus genitalia; 6 – Aedeagus; 7-8 – *C. (Cr.) zwieri* sp. nov. prep. RV1532: 7 – Habitus genitalia; 8 – Aedeagus.

Plate 137

DE VOS, R.: The *Cyana* Walker, 1854 species of New Guinea, with description of a new subgenus ...



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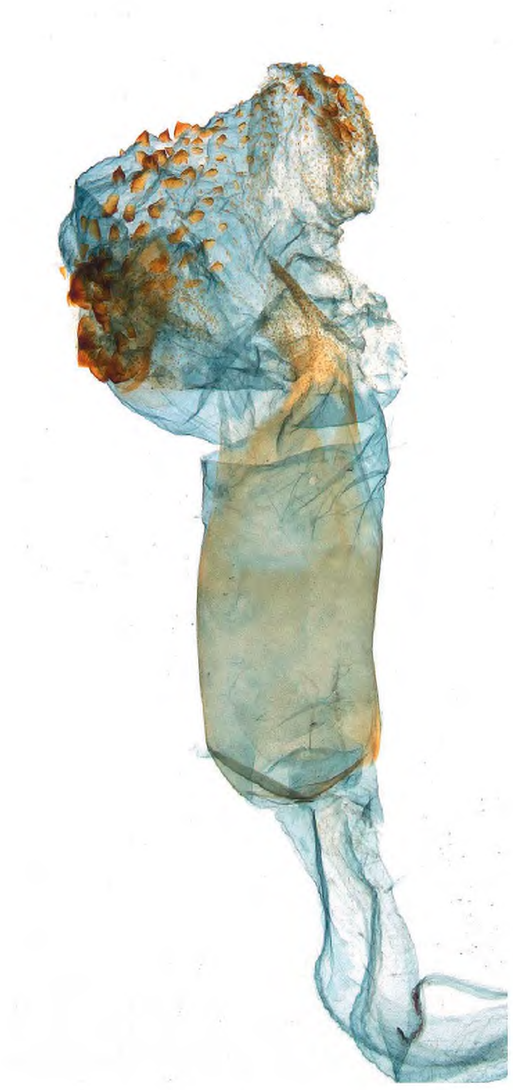
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Figures 1-8. Male genitalia of *Cyana (Cryptanaema)* species. 1-2 – *C. (Cr.) melanoplagia melanoplagia* (Hampson, 1900) prep. BM–RV1512: 1 – Habitus genitalia; 2 – Aedeagus; 3-4 – *C. (Cr.) melanoplagia orcheia* (Rothschild, 1916) prep. BM–RV1514: 3 – Habitus genitalia; 4 – Aedeagus; 5-6 – *C. (Cr.) melanoplagia extrema* ssp. nov. prep. BM–RV1516: 5 – Habitus genitalia; 6 – Aedeagus; 7-8 – *C. (Cr.) aroa* (Bethune-Baker, 1904) prep. BM–RV1520: 7 – Habitus genitalia; 8 – Aedeagus.

Plate 138

DE VOS, R.: The *Cyana* Walker, 1854 species of New Guinea, with description of a new subgenus ...



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Figures 1-8. Male genitalia of *Cyana (Cryptanaema)* species. 1-2 – *C. (Cr.) charybdis* (Bethune-Baker, 1904) prep. BM–RV1524: 1 – Habitus genitalia; 2 – Aedeagus; 3-4 – *C. (Cr.) fumea* (Hampson, 1900) prep. RV1536: 3 – Habitus genitalia; 4 – Aedeagus; 5-6 – *C. (Cr.) punctistrigosa* (Rothschild, 1913) prep. RV1527: 5 – Habitus genitalia; 6 – Aedeagus; 7-8 – *C. (Cr.) gracilis* sp. nov. prep. KSP–42271: 7 – Habitus genitalia; 8 – Aedeagus.

Plate 139

DE VOS, R.: The *Cyana* Walker, 1854 species of New Guinea, with description of a new subgenus ...



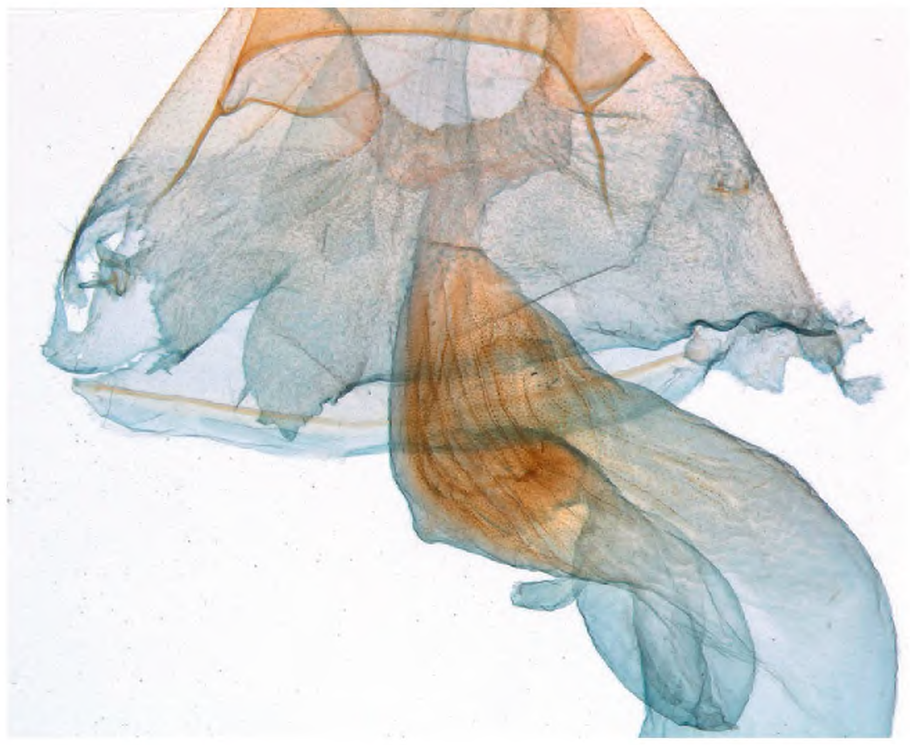
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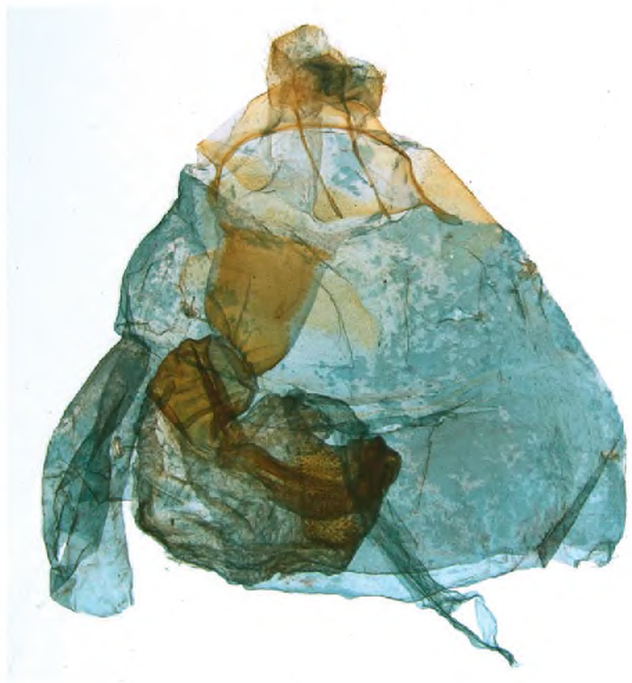


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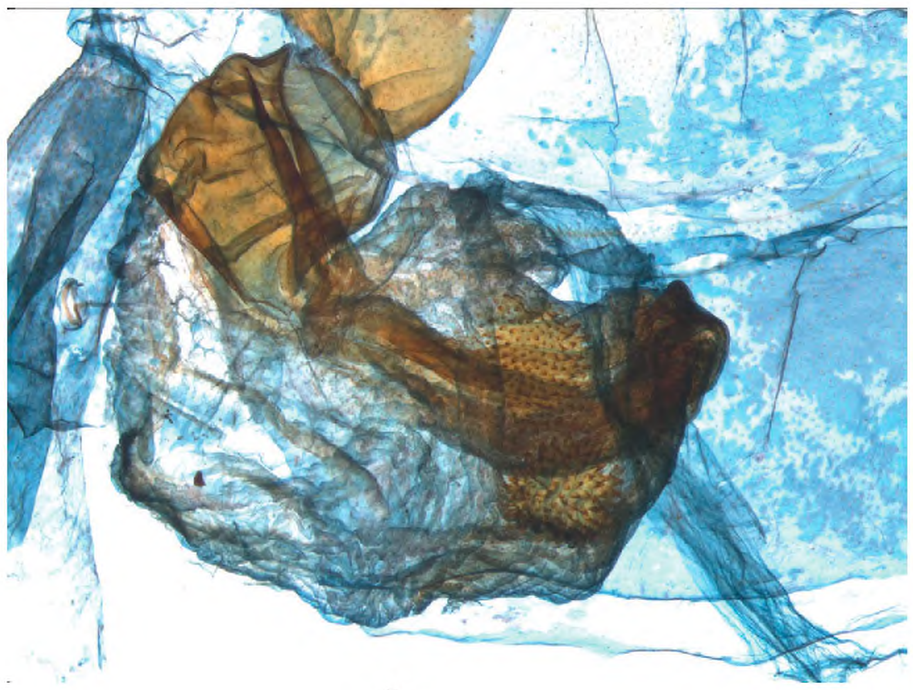
Figures 1-7. Male and female genitalia of *Cyana* species. 1-2 – Male genitalia of *Cyana (Cryptanaema) brunnea* (Bethune-Baker, 1904) prep. BM–RV1522: 1 – Habitus genitalia; 2 – Aedeagus; 3-5 – Female genitalia of *Cyana (Cyana) transfasciata* (Rothschild, 1912) prep. BM–RV1529: 3 – Habitus genitalia; 4 – Cervix; 5 – Signum; 6-7 – Female genitalia of *Cyana (Clerckia) tegyra postdivisa* (Rothschild, 1913) prep. RV1547: 6 – Habitus genitalia; 7 – Cervix and signum.

Plate 140

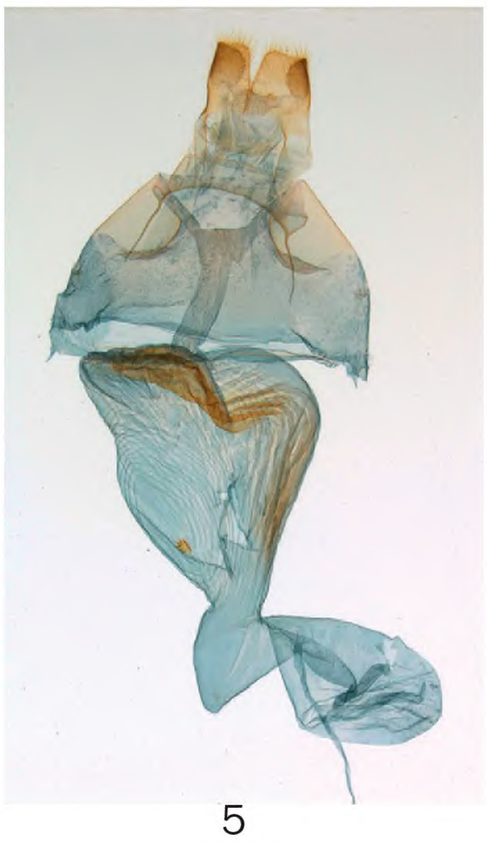
DE VOS, R.: The *Cyana* Walker, 1854 species of New Guinea, with description of a new subgenus ...



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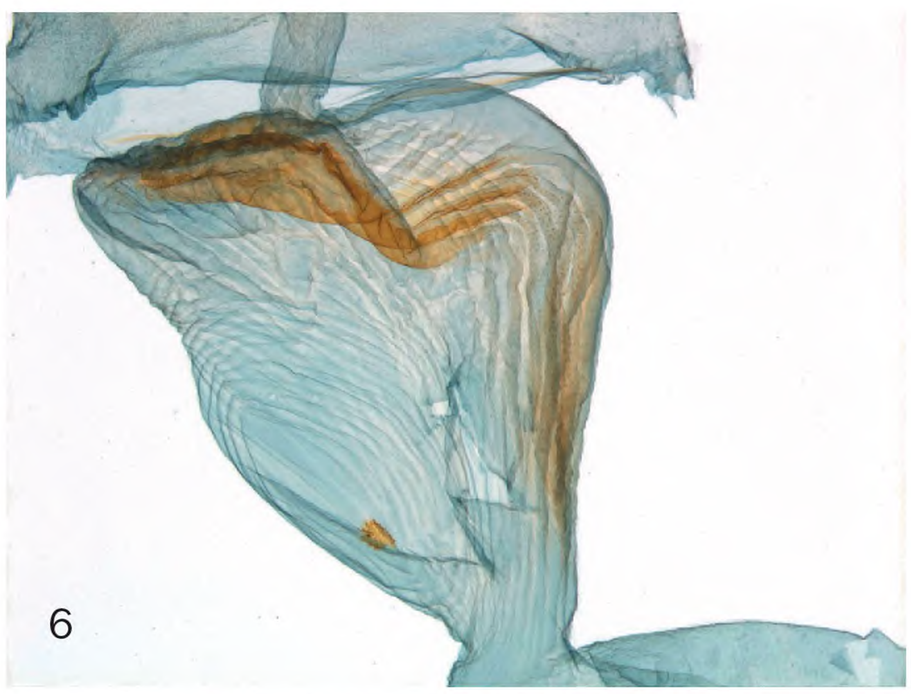
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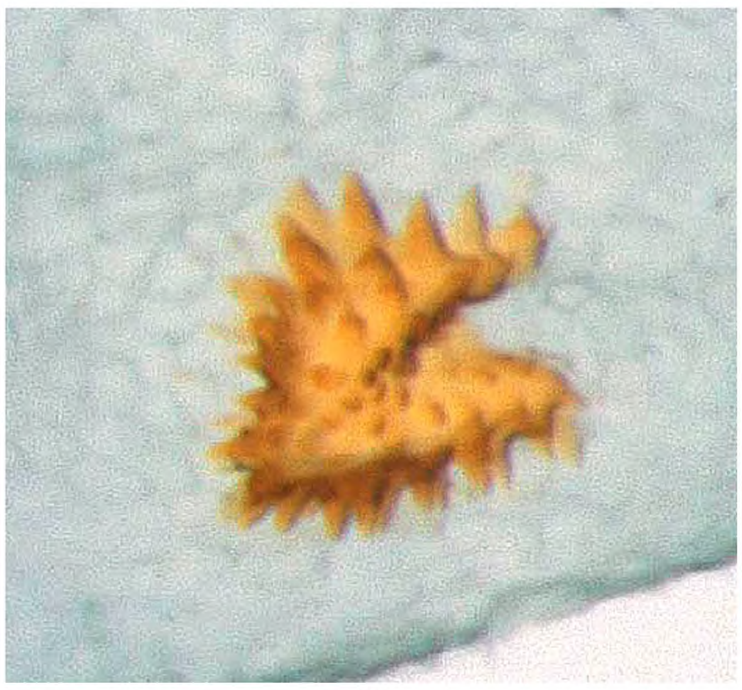
Figures 1-9. Female genitalia of *Cyana* species. 1-2 – *C. (Clerckia) trigona* Rothschild, 1903 prep. RV1558: 1 – Habitus genitalia; 2 – Cervix and signum; 3-4 – *C. (Cl.) thoracica* Rothschild, Jordan, 1901 prep. RV1556: 3 – Habitus genitalia; 4 – Cervix and signa; 5-7 – *C. (Cryptanaema) nigroplagata* (Bethune-Baker, 1910) prep. RV1531: 5 – Habitus genitalia; 6 – Cervix and Signum; 7 – Signum; 8-9 – *C. (Cr.) basialba* (Rothschild, 1913) prep. RV1534: 8 – Habitus genitalia; 9 – Signum.

Plate 141

DE VOS, R.: The *Cyana* Walker, 1854 species of New Guinea, with description of a new subgenus ...



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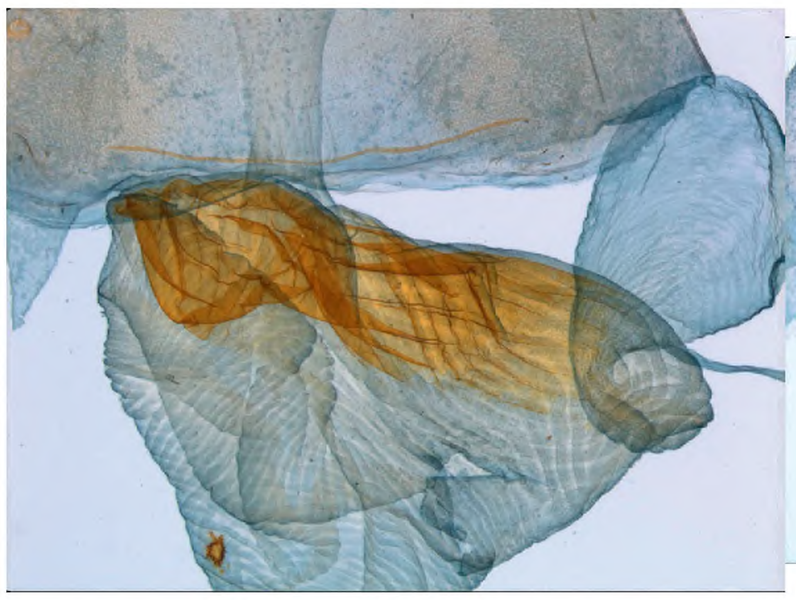
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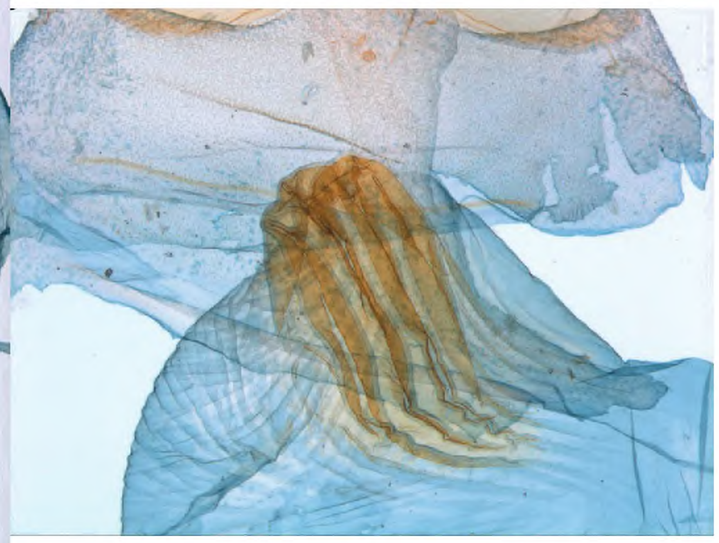
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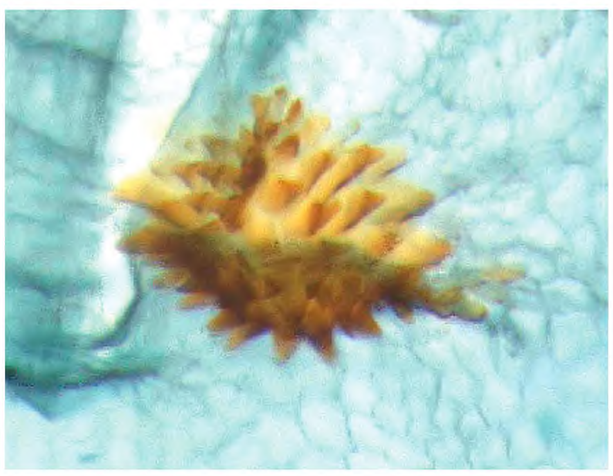
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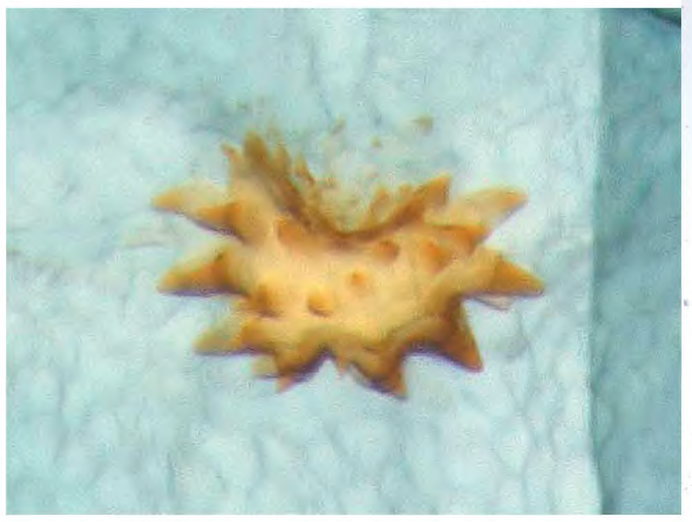


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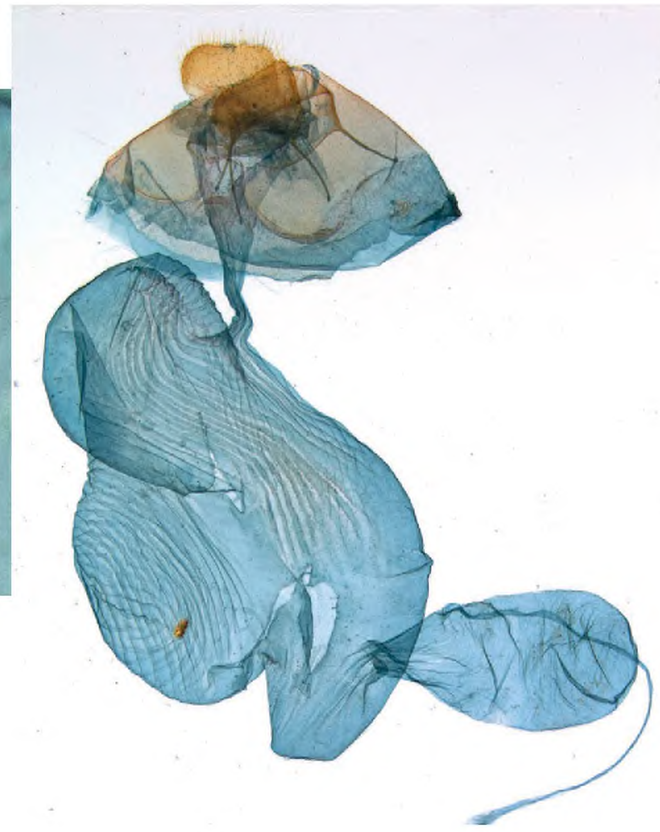
Figures 1-10. Female genitalia of *Cyana (Cryptanaema)* species. 1-2 – *C. (Cr.) molbakon* sp. nov. prep. RV1567: 1 – Habitus genitalia; 2 – Signum; 3-5 – *C. (Cr.) inusitata* (Bethune-Baker, 1910) prep. RV1539: 3 – Habitus genitalia; 4 – Cervix; 5 – Signum; 6-8 – *C. (Cr.) zwieri* sp. nov. prep. RV1533: 6 – Habitus genitalia; 7 – Cervix; 8 – Signum; 9-10 – *C. (Cr.) melanoplagia melanoplagia* (Hampson, 1900) prep. BM–RV1513: 9 – Habitus genitalia; 10 – Signum.

Plate 142

DE VOS, R.: The *Cyana* Walker, 1854 species of New Guinea, with description of a new subgenus ...



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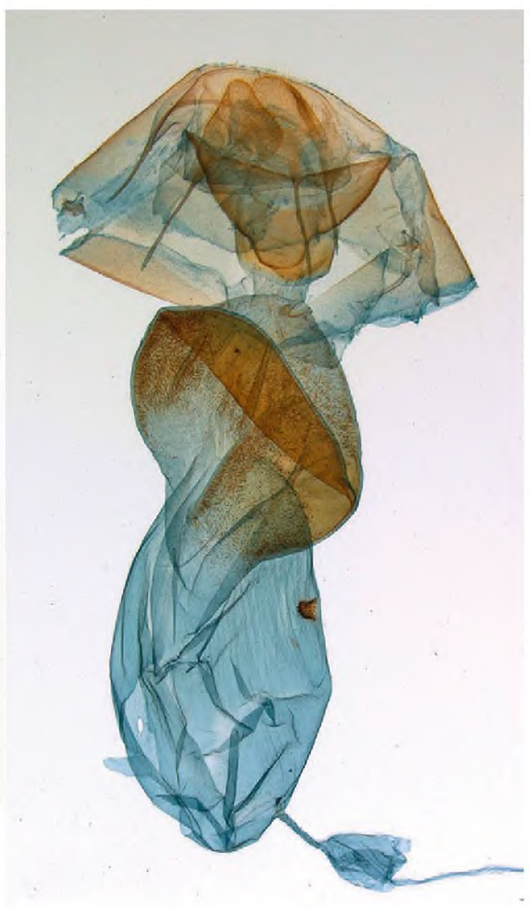
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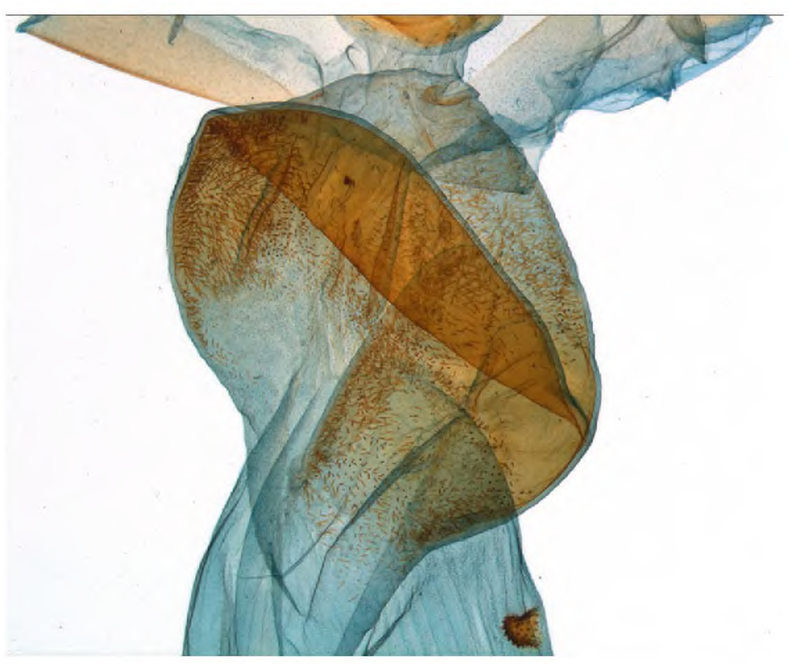
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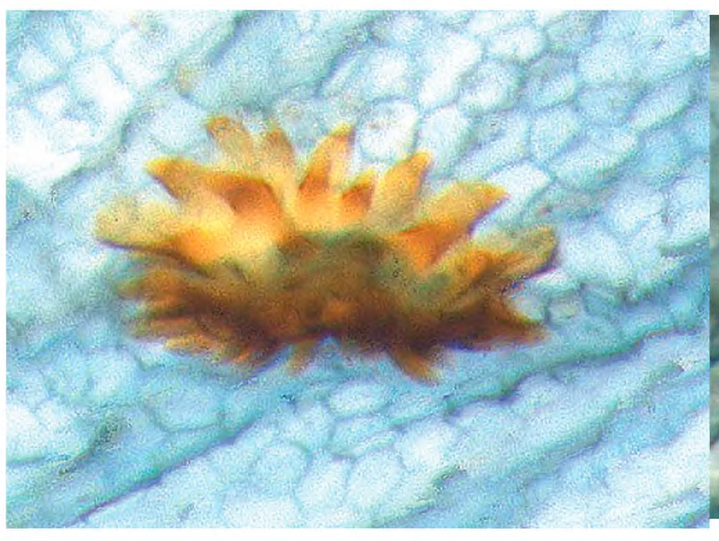
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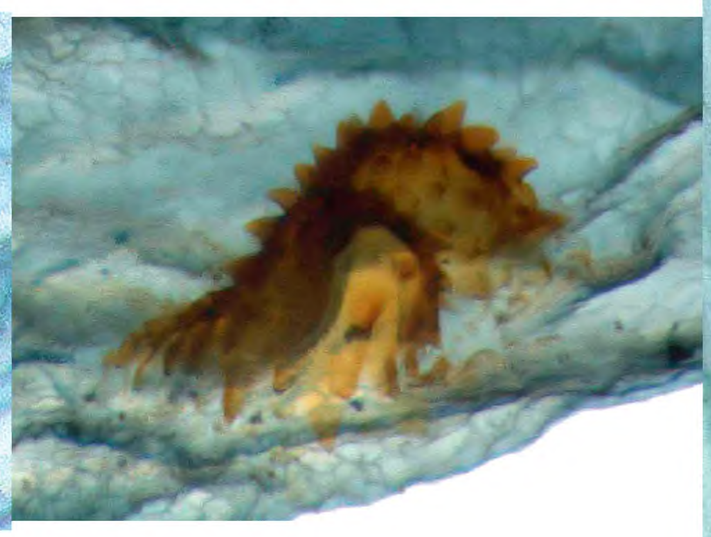
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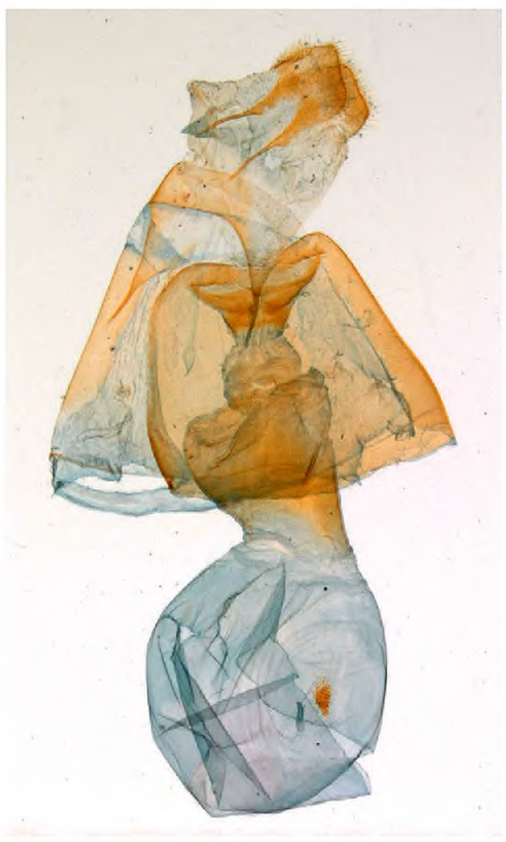


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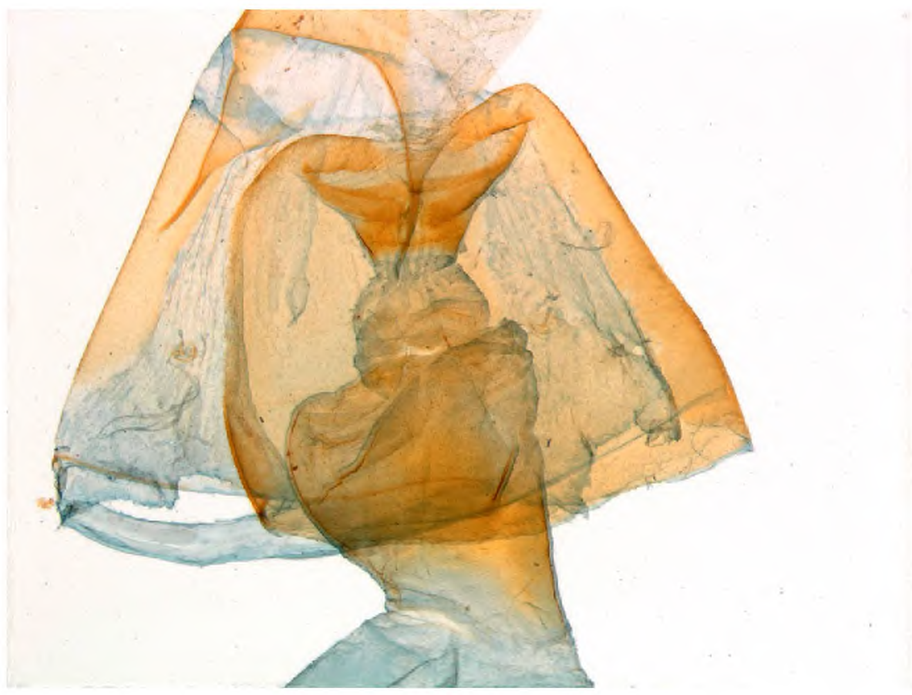
Figures 1-9. Female genitalia of *Cyana (Cryptanaema)* species. 1-2 – *C. (Cr.) melanoplagia orcheia* (Rothschild, 1916) prep. BM–RV1515: 1 – Habitus genitalia; 2 – Signum; 3-4 – *C. (Cr.) melanoplagia extrema* ssp. nov. prep. BM–RV1517: 3 – Habitus genitalia; 4 – Signum; 5-6 – *C. (Cr.) aroa* (Bethune-Baker, 1904) prep. BM–RV1521: 5 – Habitus genitalia; 6 – Signum; 7-9 – *C. (Cr.) charybdis* (Bethune-Baker, 1904) prep. BM–RV1525: 7 – Habitus genitalia; 8 – Cervix; 9 – Signum.

Plate 143

DE VOS, R.: The *Cyana* Walker, 1854 species of New Guinea, with description of a new subgenus ...



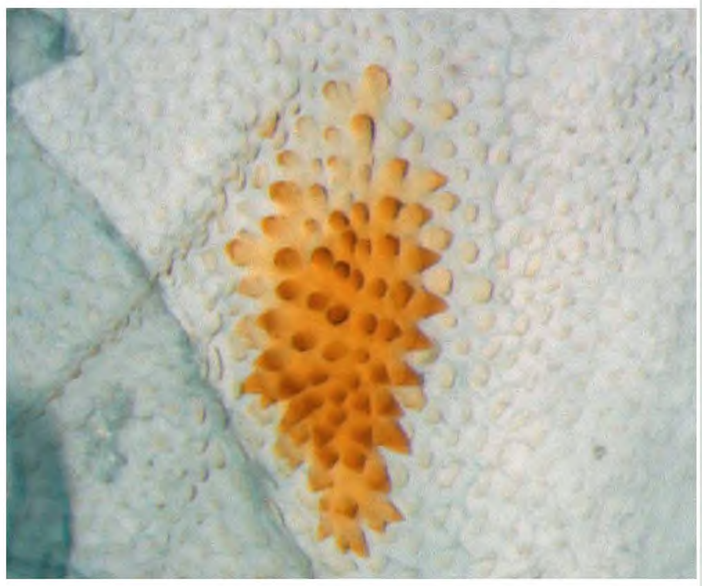
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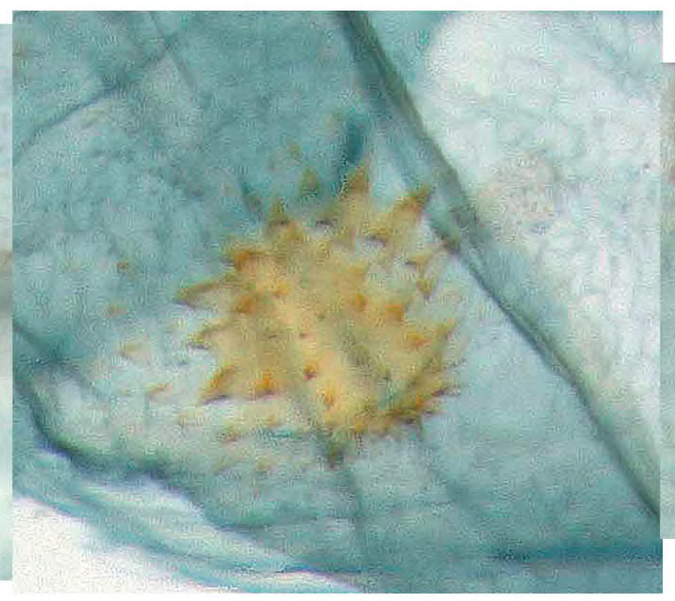
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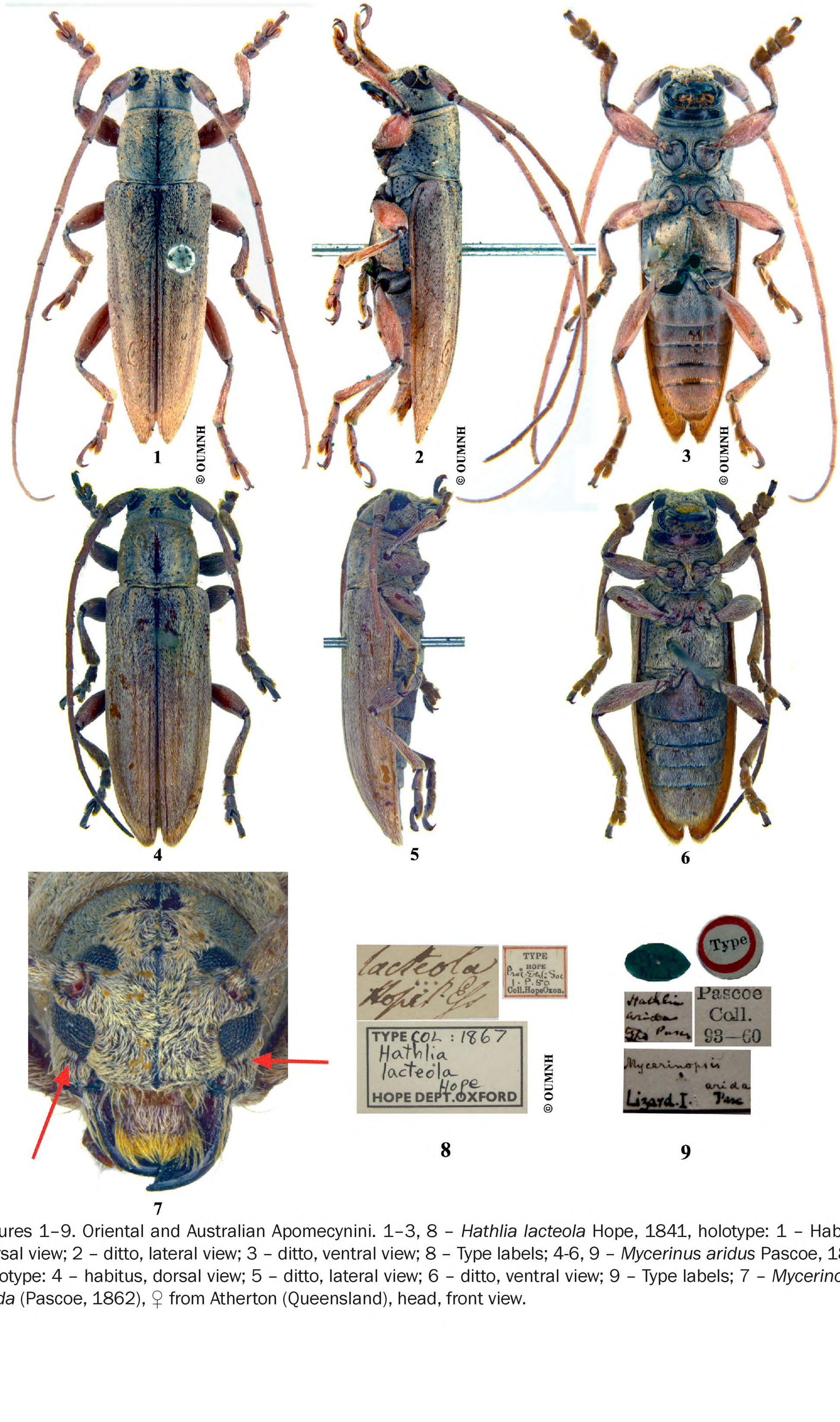


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Figures 1-9. Female genitalia of *Cyana (Cryptanaema)* species. 1-3 – *C. (Cr.) fumea* (Hampson, 1900) prep. RV1537: 1 – Habitus genitalia; 2 – Cervix; 3 – Signum; 4-5 – *C. (Cr.) punctistrigosa* (Rothschild, 1913) prep. RV1526: 4 – Habitus genitalia; 5 – Signum; 6-7 – *C. (Cr.) gracilis* sp. nov. prep. KSP–42283: 6 – Habitus genitalia; 7 – Signum; 8-9 – *C. (Cr.) brunnea* (Bethune-Baker, 1904) prep. BM–RV1523: 8 – Habitus genitalia; 9 – Signum.



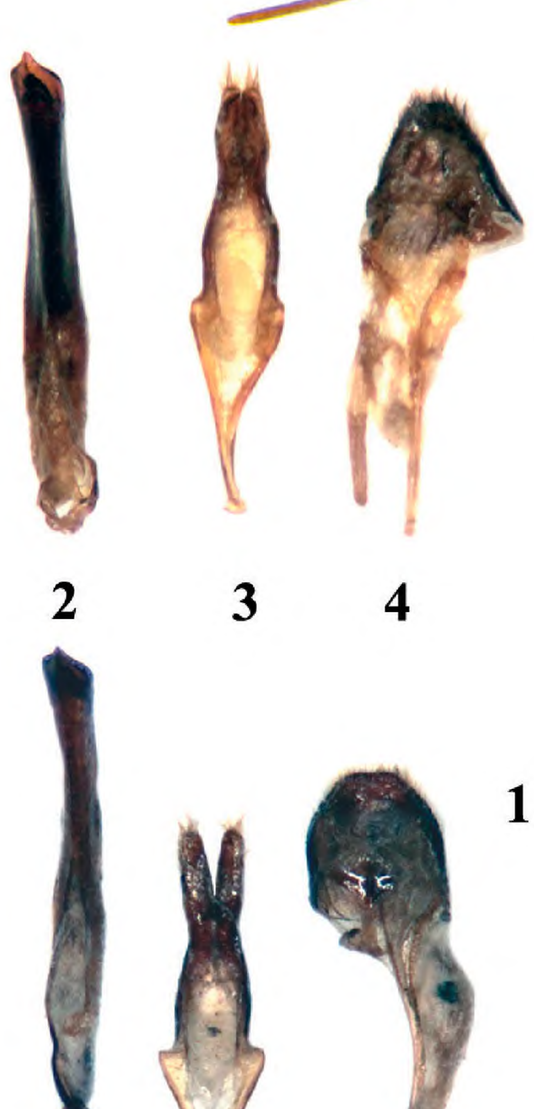
Figures 1–9. Oriental and Australian Apomecynini. 1–3, 8 – *Hathlia lacteola* Hope, 1841, holotype: 1 – Habitus, dorsal view; 2 – ditto, lateral view; 3 – ditto, ventral view; 8 – Type labels; 4-6, 9 – *Mycerinus aridus* Pascoe, 1862, holotype: 4 – habitus, dorsal view; 5 – ditto, lateral view; 6 – ditto, ventral view; 9 – Type labels; 7 – *Mycerinopsis arida* (Pascoe, 1862), ♀ from Atherton (Queensland), head, front view.



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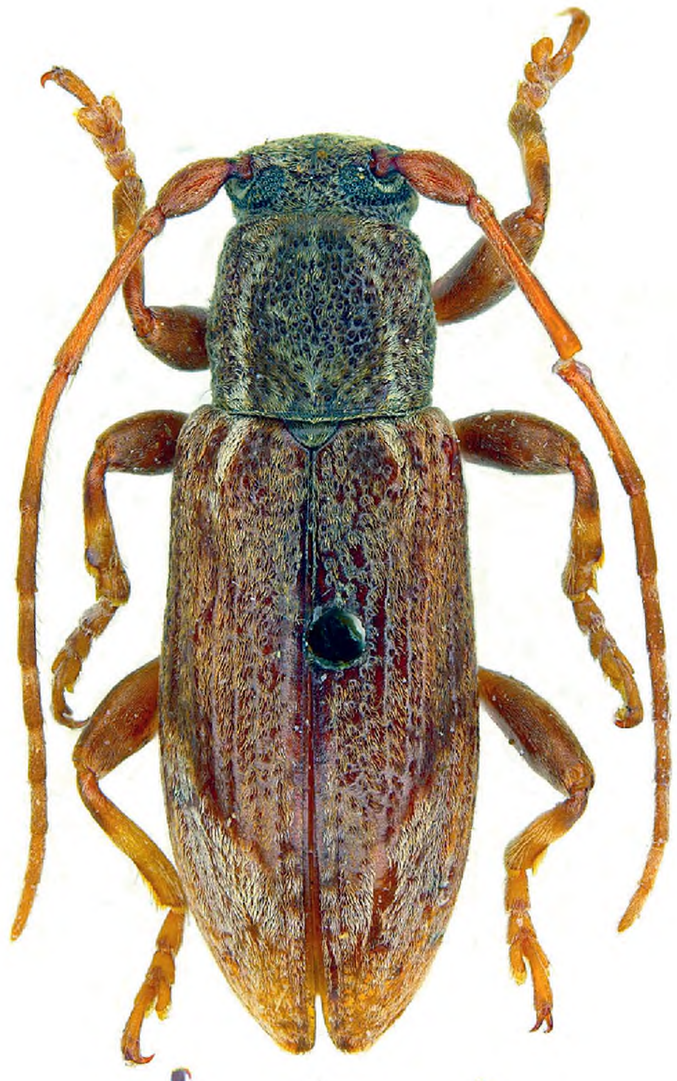


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Figures 1-9. Oriental and Australian Apomecynini. 1-4 – *Lamprosybra sulcata* Breuning, 1960, lectotype: 1 – Habitus, dorsal view; 2 – Aedeagus; 3 – Tegmen; 4 – Tergite VIII; 5-8 – *Lamprosybra fuscipennis* Aurivillius, 1928, lectotype: 5 – Habitus, dorsal view; 6 – Aedeagus; 7 – Tegmen; 8 – Tergite VIII; 9 – *Oopsis obtusipennis* Aurivillius, 1928, paratype, dorsal view [figs 2-4 & 6-8 scale bar 1 mm].



Figures 1-9. Habitus of Oriental and Australian Apomecynini, dorsal view. 1 – *Bityle bicolor* Pascoe, 1865, holotype; 2 – *Cylindroplocia pseudobityle* Heller, 1924, holotype; 3 – *C. pseudobityle* ab. *crucifera* Heller, 1924, holotype; 4 – *C. basimaculata* Heller, 1924, holotype; 5 – *C. basimaculata* ab. *teres* Heller, 1924, holotype; 6 – *C. alboscutellaris* Heller, 1924, holotype; 7 – *C. helleri* Schwarzer, 1931 syn. nov., holotype; 8 – *C. modesta* Heller, 1924, holotype; 9 – *Sybra albostictica* Breuning, 1960, holotype.



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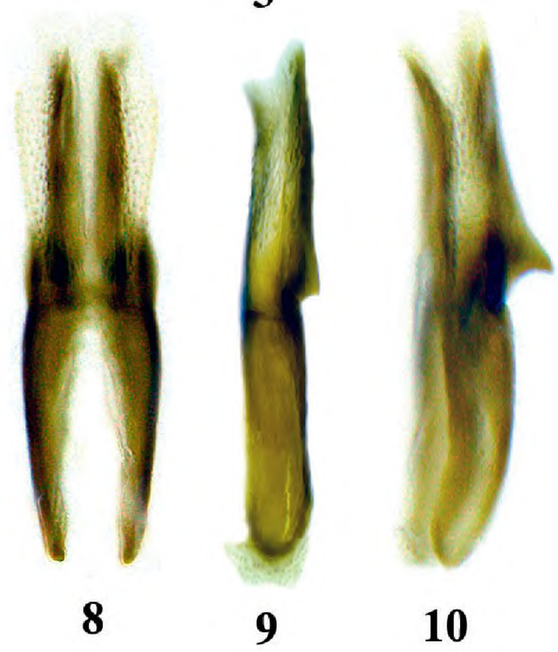
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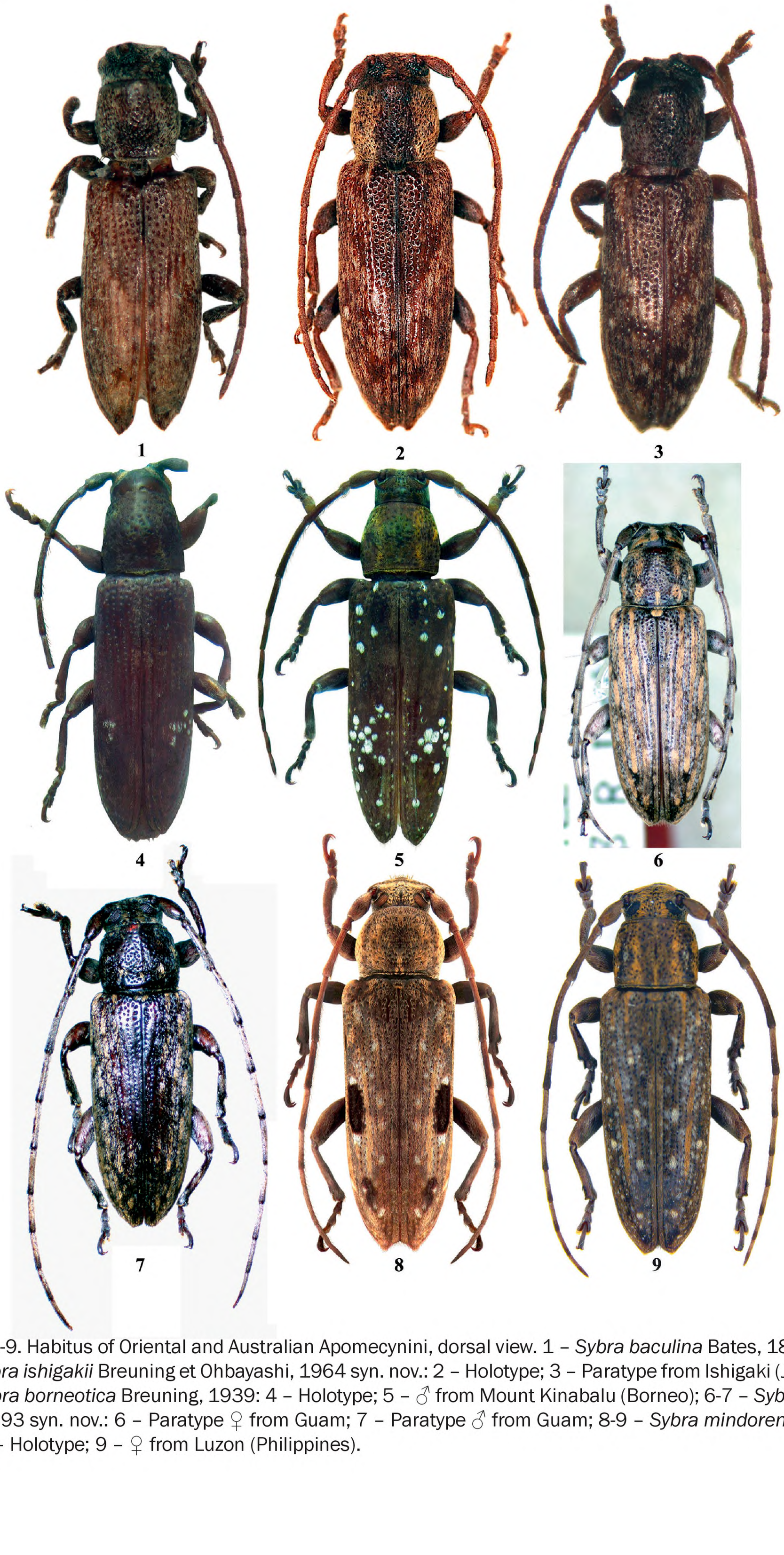


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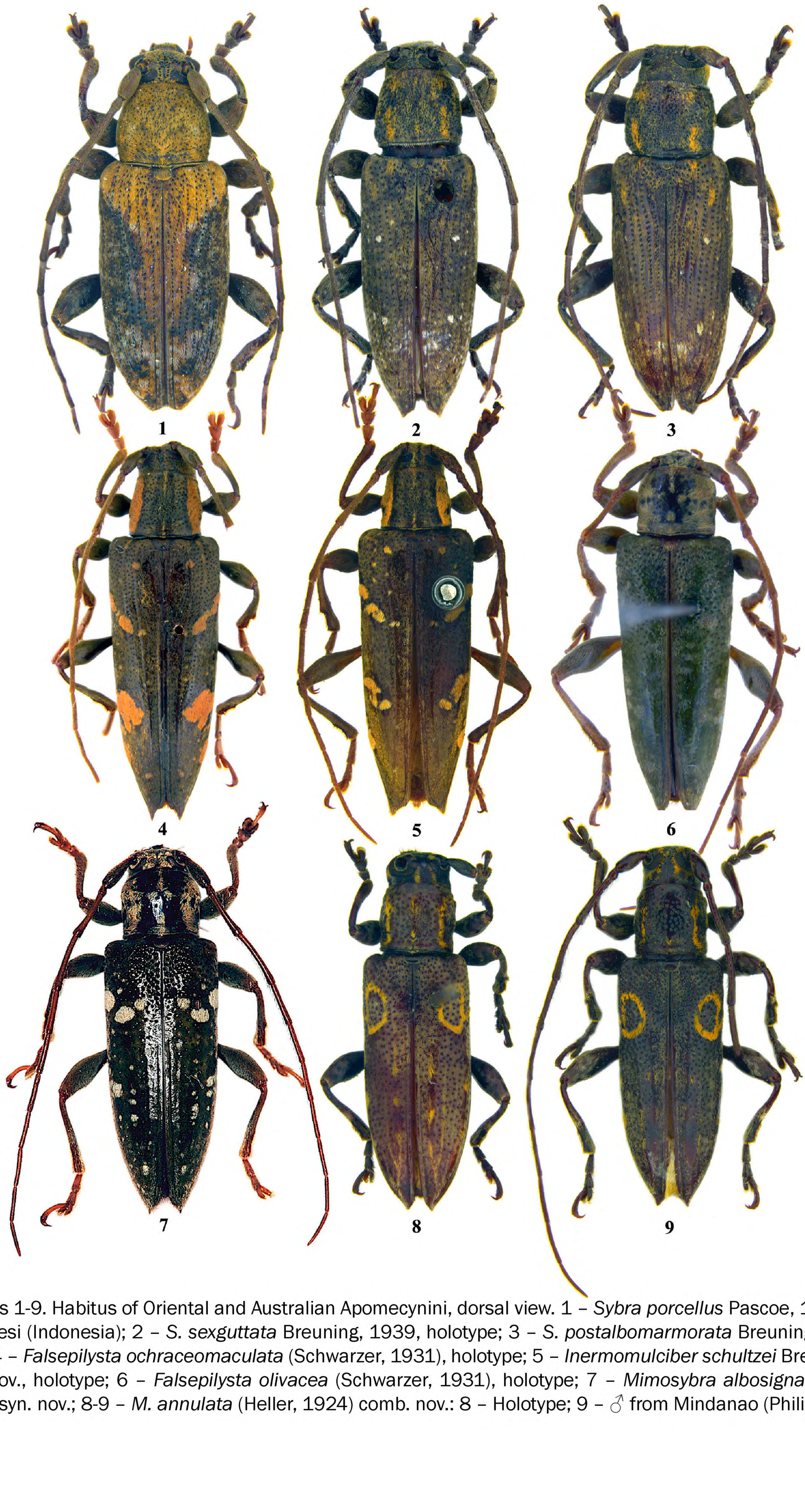
1 mm

Figures 1-11. Oriental and Australian Apomecynini. 1-2 – *Sybromimus obliquatus* Breuning, 1940, neotype: 1 – Habitus, dorsal view; 2 – ditto, ventral view; 3-9 – *Sybra ochreoguttata* Breuning, 1939, neotype: 3 – Habitus, dorsal view; 4 – Tergite VIII; 5 – Tegmen; 6 – Aedeagus, ventral view; 7 – ditto, lateral view; 8 – Fibula, ventral view; 9 – ditto, lateral view; 10-11 – *Sybra ochreoguttata* Breuning, 1939 ♂ from Mindanao: 10 – Fibula, lateral view; 11 – Pronotum [figs 4-7 scale bar 1 mm, figs 8-10 scale bar 0.5 mm].

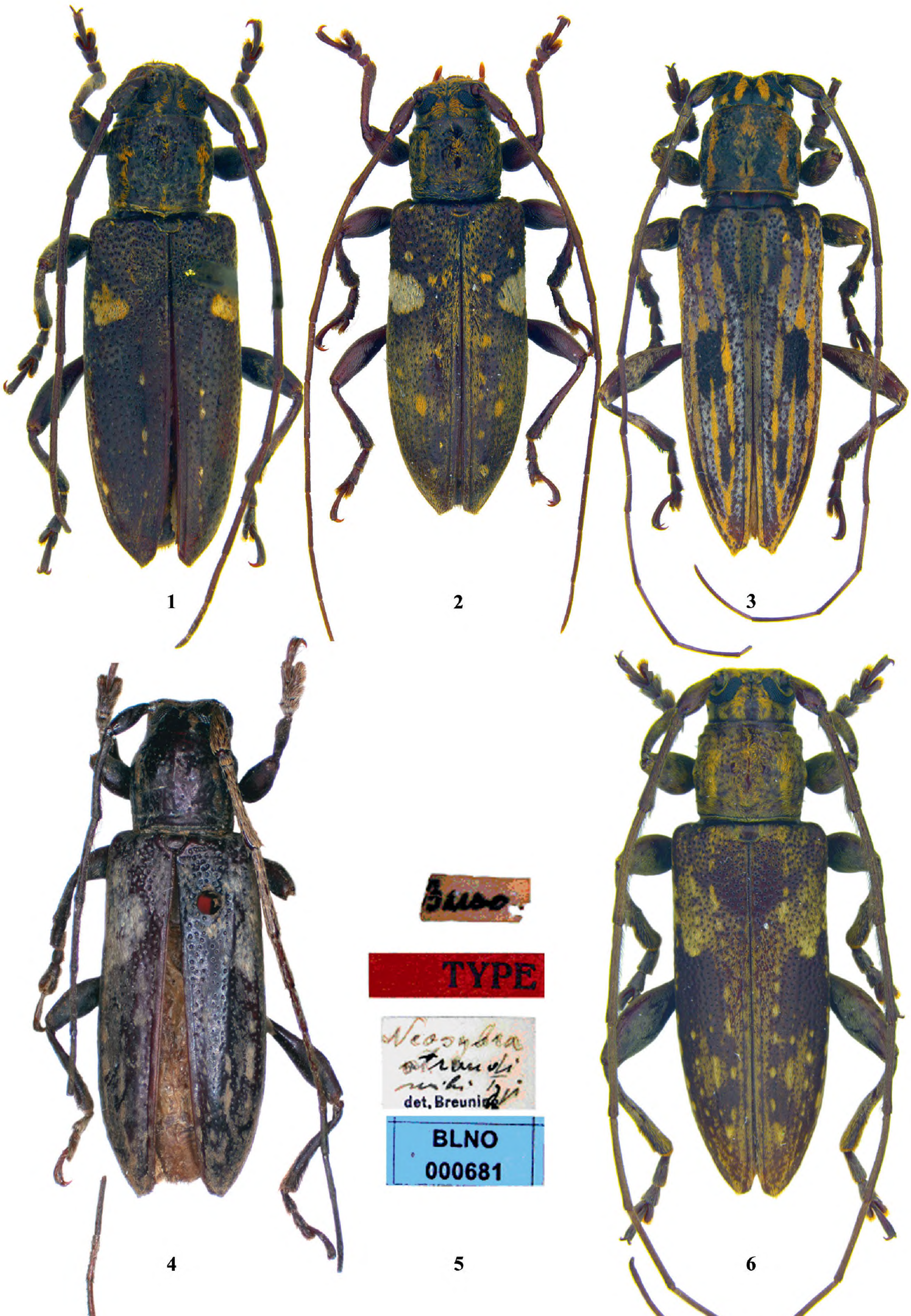


Figures 1-9. Habitus of Oriental and Australian Apomecynini, dorsal view. 1 – *Sybra baculina* Bates, 1866, holotype; 2-3 – *Sybra ishigakii* Breuning et Ohbayashi, 1964 syn. nov.: 2 – Holotype; 3 – Paratype from Ishigaki (Japan) (ISNB); 4-5 – *Sybra borneotica* Breuning, 1939: 4 – Holotype; 5 – ♂ from Mount Kinabalu (Borneo); 6-7 – *Sybra guamensis* Iwata, 1993 syn. nov.: 6 – Paratype ♀ from Guam; 7 – Paratype ♂ from Guam; 8-9 – *Sybra mindorensis* Aurivillius, 1927: 8 – Holotype; 9 – ♀ from Luzon (Philippines).

Figures 1-9. Oriental and Australian Apomecynini. 1-5 – *Sybra marcida* Pascoe, 1865: 1 – Holotype, habitus, dorsal view; 2 – *S. papuana* Breuning, 1939 syn. nov., holotype, dorsal view; 3 – ♂ from Yapen (West New Guinea), dorsal view; 4 – ♀ from Mokwam (West New Guinea, Doberai Peninsula), dorsal view; 5 – Aedeagus with endophallus; 6 – *S. ochreovittipennis* Breuning, 1964, holotype, dorsal view; 7 – *S. samarana* Breuning, 1970 syn. nov., holotype, dorsal view; 8 – ♀ from Leyte (Philippines) (USNM), dorsal view; 9 – *S. proximata* Breuning, 1942 syn. nov., holotype, dorsal view.



Figures 1-9. Habitus of Oriental and Australian Apomecynini, dorsal view. 1 – *Sybra porcellus* Pascoe, 1865 ♂ from Sulawesi (Indonesia); 2 – *S. sexguttata* Breuning, 1939, holotype; 3 – *S. postalbomarmorata* Breuning, 1964 syn. nov.; 4 – *Falsepilysta ochraceomaculata* (Schwarzer, 1931), holotype; 5 – *Inermomulciber schultzei* Breuning, 1974 syn. nov., holotype; 6 – *Falsepilysta olivacea* (Schwarzer, 1931), holotype; 7 – *Mimosybra albosignata* Breuning, 1982 syn. nov.; 8-9 – *M. annulata* (Heller, 1924) comb. nov.: 8 – Holotype; 9 – ♂ from Mindanao (Philippines).



Figures 1-6. Oriental and Australian Apomecynini. 1-2 – *Mimosybra bimaculata* (Breuning, 1939) comb. nov.: 1 – Holotype, habitus, dorsal view; 2 – ♂ from Sulawesi (Indonesia); 3 – *M. borneana* (Breuning, 1961) comb. nov. ♂ from Ranau (Malaysia); 4-6 – *M. strandi* (Breuning, 1938) comb. nov.: 4 – Holotype, habitus, dorsal view; 5 – Type labels; 6 – ♂ from Taiwan (China).



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Figures 1-6. Habitus of *Eudocima* species. 1 – *E. aurantia* (Moore, 1877), ♂, Sudest I.; 2 – ditto, ♀, Sudest I.; 3 – *E. prolai* Zilli, Hogenes, 2002, ♂, New Guinea; 4 – ditto, ♀, New Guinea; 5 – *E. cocalus* (Cramer, [1777]), ♂, Vulcan I.; 6 – ditto, ♀, Fergusson I.



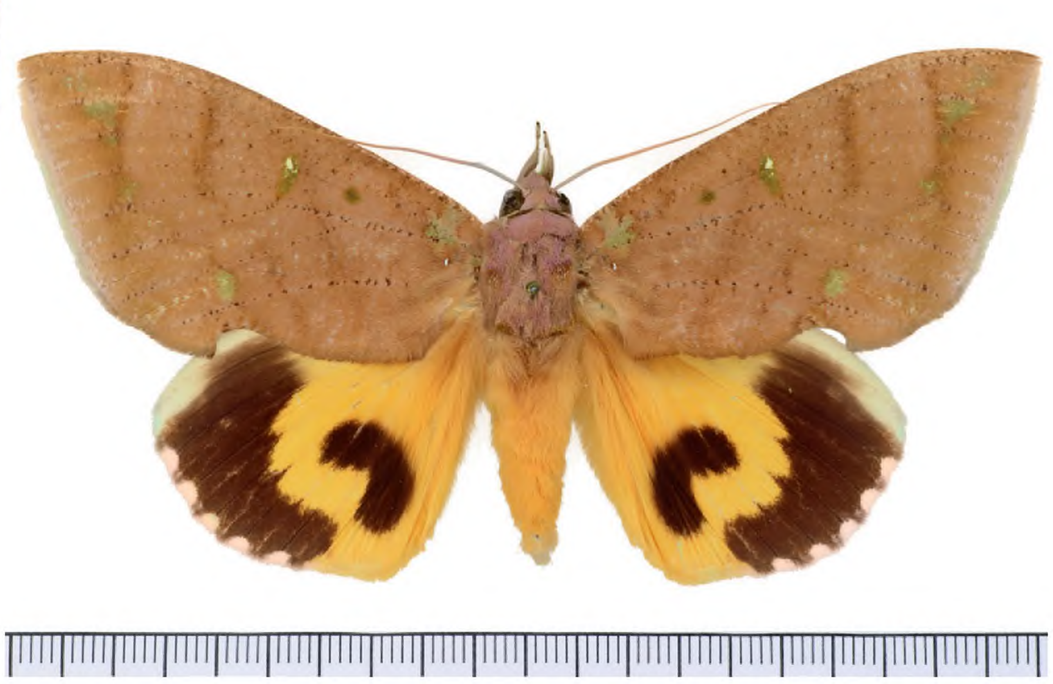
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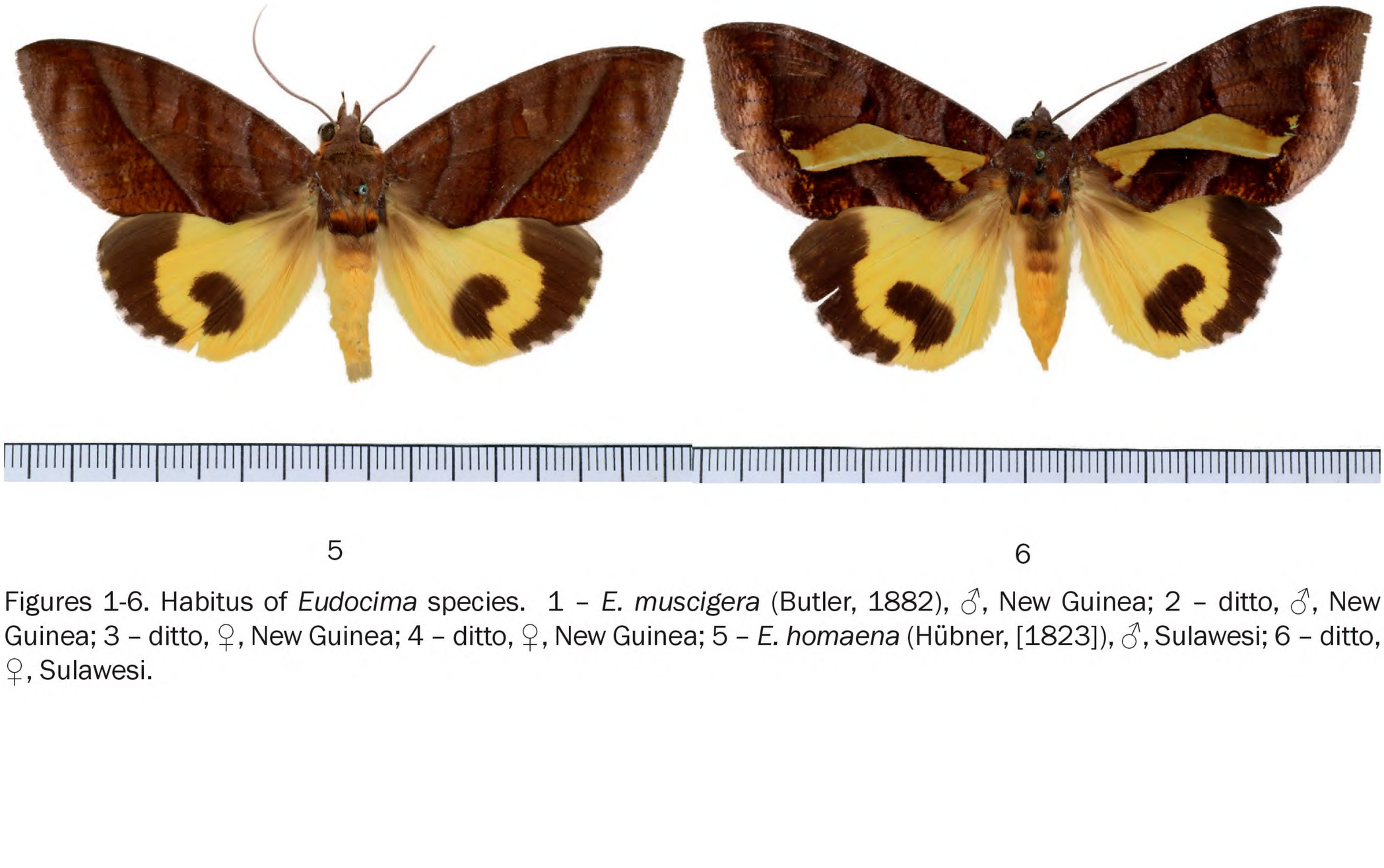
Figures 1-6. Habitus of *Eudocima* species. 1 – *E. hypermnestra* (Stoll, [1780]), ♂, India; 2 – ditto, ♂, Vietnam; 3 – ditto, ♀, "Malaya"; 4 – *E. discrepans* (Walker, [1858]), ♂, Sumatra; 5 – ditto, ♂, Lombok I.; 6 – ditto, ♀, Borneo.



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Figures 1-6. Habitus of *Eudocima* species. 1 – *E. muscigera* (Butler, 1882), ♂, New Guinea; 2 – ditto, ♂, New Guinea; 3 – ditto, ♀, New Guinea; 4 – ditto, ♀, New Guinea; 5 – *E. homaena* (Hübner, [1823]), ♂, Sulawesi; 6 – ditto, ♀, Sulawesi.



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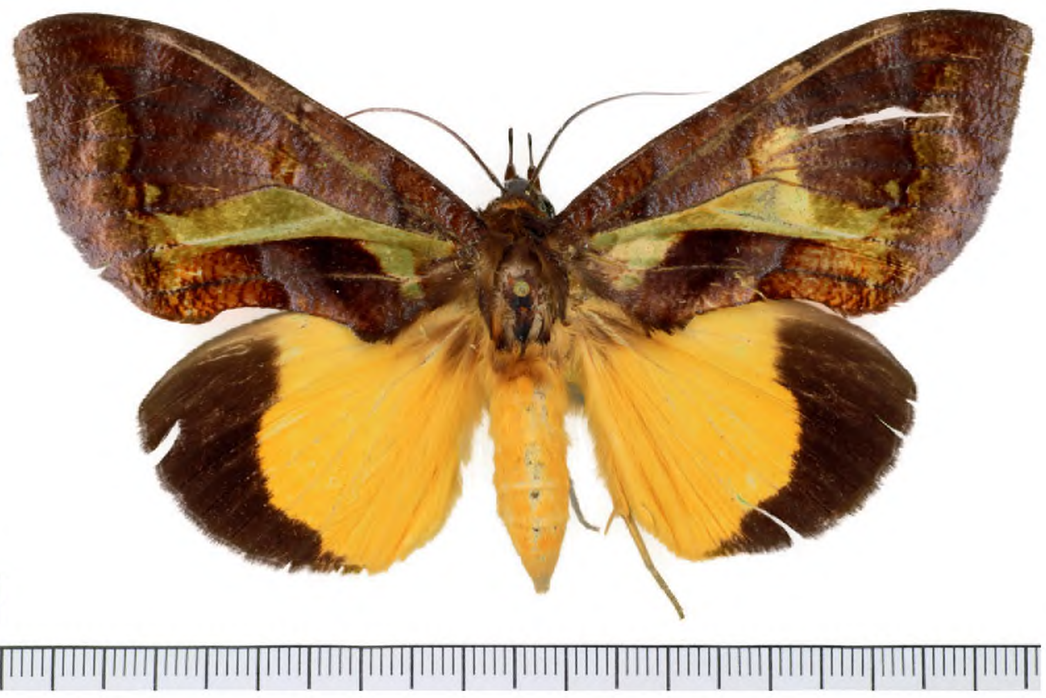


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Figures 1-6. Habitus of *Eudocima caesar* (C. Felder, 1861). 1 – ♂, Seram; 2 – ditto, ♂ (syntype *Othreis prattorum* A.E. Prout, 1922), Seram; 3 – ditto, ♂ (syntype *O. prattorum*), Seram; 4 – ditto, syntype ♀, Ambon; 5 – ditto, ♀, Seram; 6 – ditto, ♀ (syntype *E. prattorum*), Seram.



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Figures 1-6. Habitus of *Eudocima* species. 1 – *E. iridescens* (T.P. Lucas, 1894), ♂, New Guinea; 2 – ditto, ♂, New Britain; 3 – ditto, ♀, Rossell I.; 4 – *E. srivijayana* (Bänziger, 1985), ♂, Philippines (Mindanao I.); 5 – ditto, ♂, Sulawesi; 6 – ditto, ♀, Timor I.

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Figures 1-5. Habitus of *Eudocima talboti* (A.E. Prout, 1922). 1 – Syntype ♂, Seram; 2 – ditto, syntype ♂, Seram; 3 – ditto, ♂, Ambon; 4 – ditto, ♂, Mefor I.; 5 – ditto, ♀, Halmahera.

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Figures 1-5. Habitus of *Eudocima* species. 1 – *E. cajeta* (Cramer, [1775]), ♂, Vietnam; 2 – ditto, ♀, Myanmar; 3 – *E. oliveri* sp. nov., holotype ♂, Vanuatu (Aneityum); 4 – ditto, paratype ♂, Vanuatu (Aneityum); 5 – ditto, paratype ♀, Vanuatu (Espiritu Santo).



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Figures 1-6. Habitus of *Eudocima phalonia* (Linnaeus, 1763). 1 – ♂, New Caledonia; 2 – ditto, ♂, Solomon Islands (Isabel); 3 – ditto, ♂, same as 2 (underside); 4 – ditto, ♂, Solomon Islands (New Georgia group); 5 – ditto, ♂, same as 4 (underside); 6 – ditto, ♀, Fiji (Vanua Levu).



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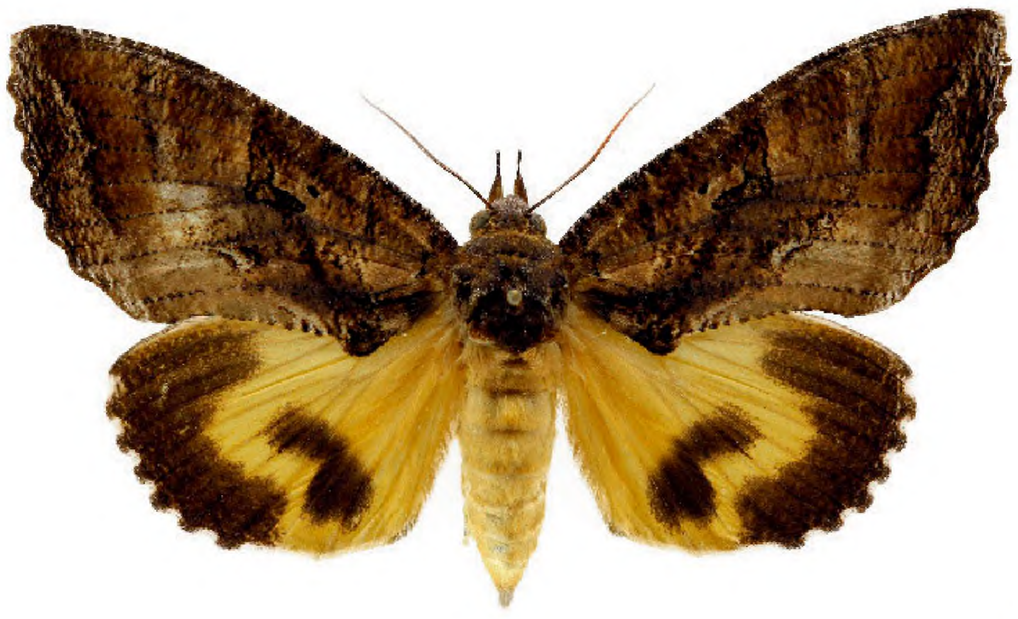
Figures 1-6. Habitus of *Eudocima phalonia* (Linnaeus, 1763). 1 – ♀, Fiji (Vanua Levu); 2 – ditto, ♀, Solomon Islands (Guadalcanal); 3 – ditto, ♀, Solomon Islands (Florida group); 4 – ditto, ♀, Solomon Islands (Choiseul); 5 – ditto, ♀, Palau (Koror); 6 – ditto, ♀, Samoa (Upolu).



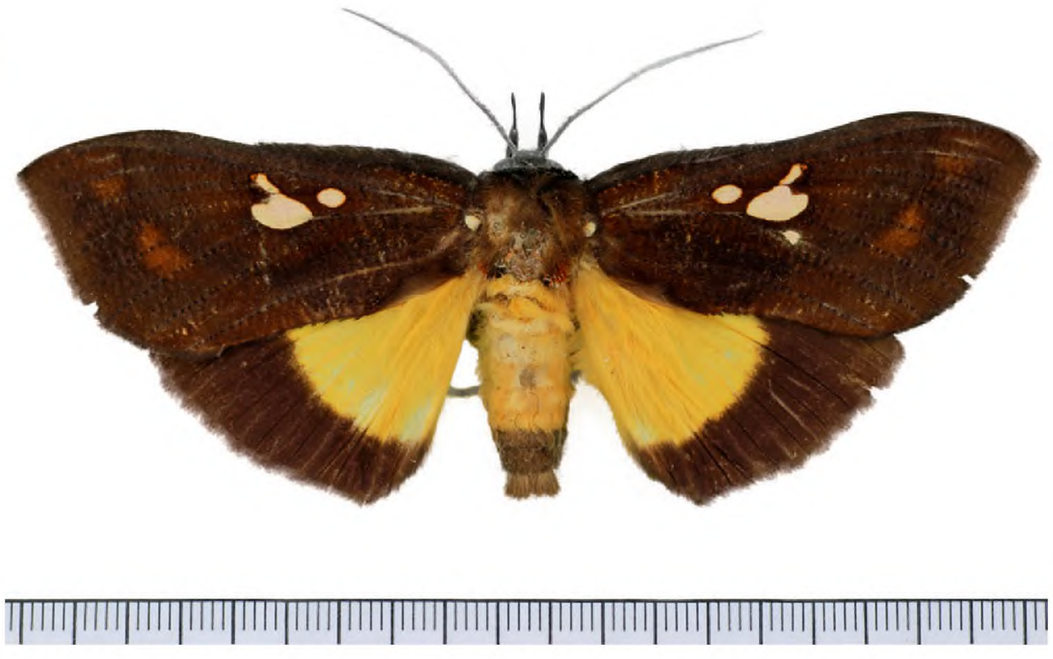
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Figures 1-6. Habitus of *Eudocima* species. 1 – *E. steppingstonia* sp. nov., holotype ♂, Marquesas Islands (Fatu Hiva); 2 – ditto, paratype ♀, Marquesas Islands (Fatu Hiva); 3 – ditto, paratype ♀, Marquesas (Fatu Hiva) (1-3 courtesy of NMNH Washington); 4 – *E. kuehni* (Pagenstecher, 1886), ♂, New Guinea; 5 – ditto, ♂ (holotype *Lagoptera pratti* Bethune-Baker, 1906), New Guinea; 6 – ditto, ♀, New Ireland.



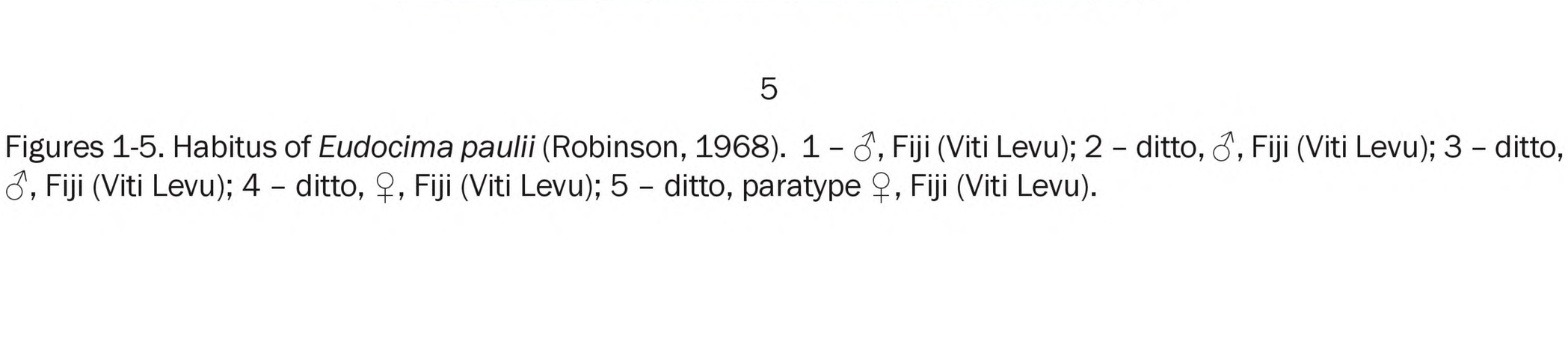
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Figures 1-5. Habitus of *Eudocima paulii* (Robinson, 1968). 1 – ♂, Fiji (Viti Levu); 2 – ditto, ♂, Fiji (Viti Levu); 3 – ditto, ♂, Fiji (Viti Levu); 4 – ditto, ♀, Fiji (Viti Levu); 5 – ditto, paratype ♀, Fiji (Viti Levu).

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Figures 1-6. Habitus of *Eudocima* species. 1 – *E. jordani* (Holland, 1900), ♂, New Guinea; 2 – ditto, ♀, New Guinea; 3 – *E. dividens* (Walker, [1858]), ♂, Malay Peninsula; 4 – ditto, ♀, Borneo; 5 – *E. nigricilia* (A.E. Prout, 1924), holotype ♂, New Guinea; 6 – ditto, ♀, New Guinea (courtesy of NBC Leiden).



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Figures 1-5. Habitus of *Eudocima salaminia* (Cramer, [1777]). 1 – ♂, Vanuatu (Erromango); 2 – ditto, ♀, Vanuatu (Erromango); 3 – ditto, ♀, Vanuatu; 4 – ditto, ♂, Solomon Islands (Guadalcanal); 6 – ditto, ♀, Solomon Islands (Guadalcanal).



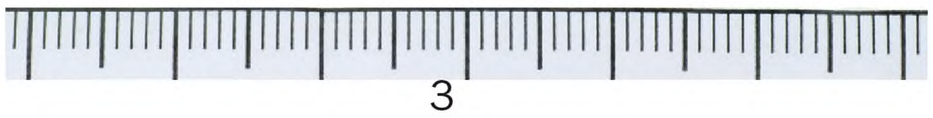
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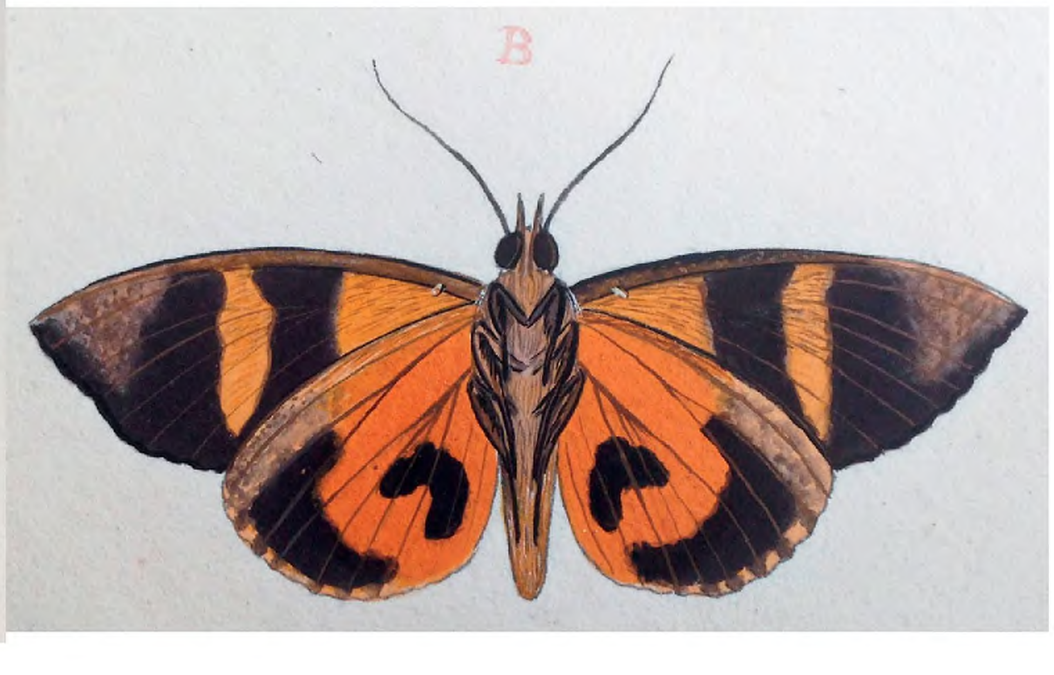


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Figures 1-5. Habitus of *Eudocima* species. 1 – *E. materna* (Linnaeus, 1767), ♂, Dawson Strait group; 2 – ditto, ♀, Dawson Strait group; 3 – *E. martini* sp. nov., holotype ♂, Solomon Islands (Rendova); 4 – ditto, paratype ♀, Bougainville; 5 – *E.* cf. *martini* sp. nov., ♀, Solomon Islands (Guadalcanal).



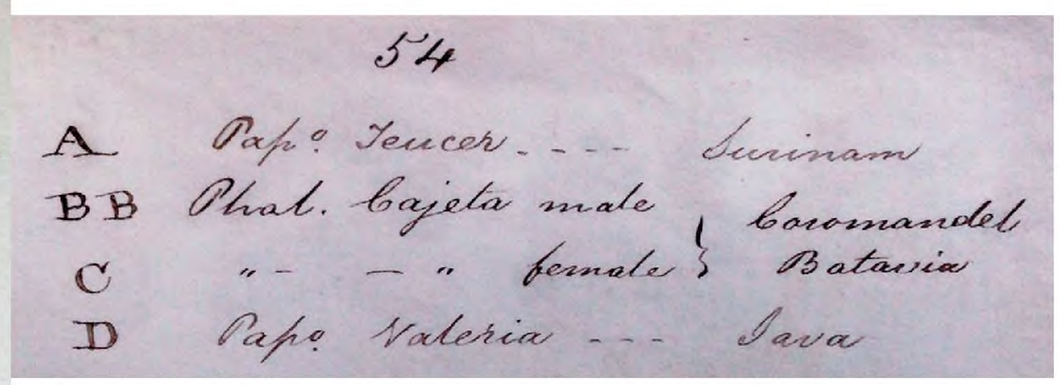
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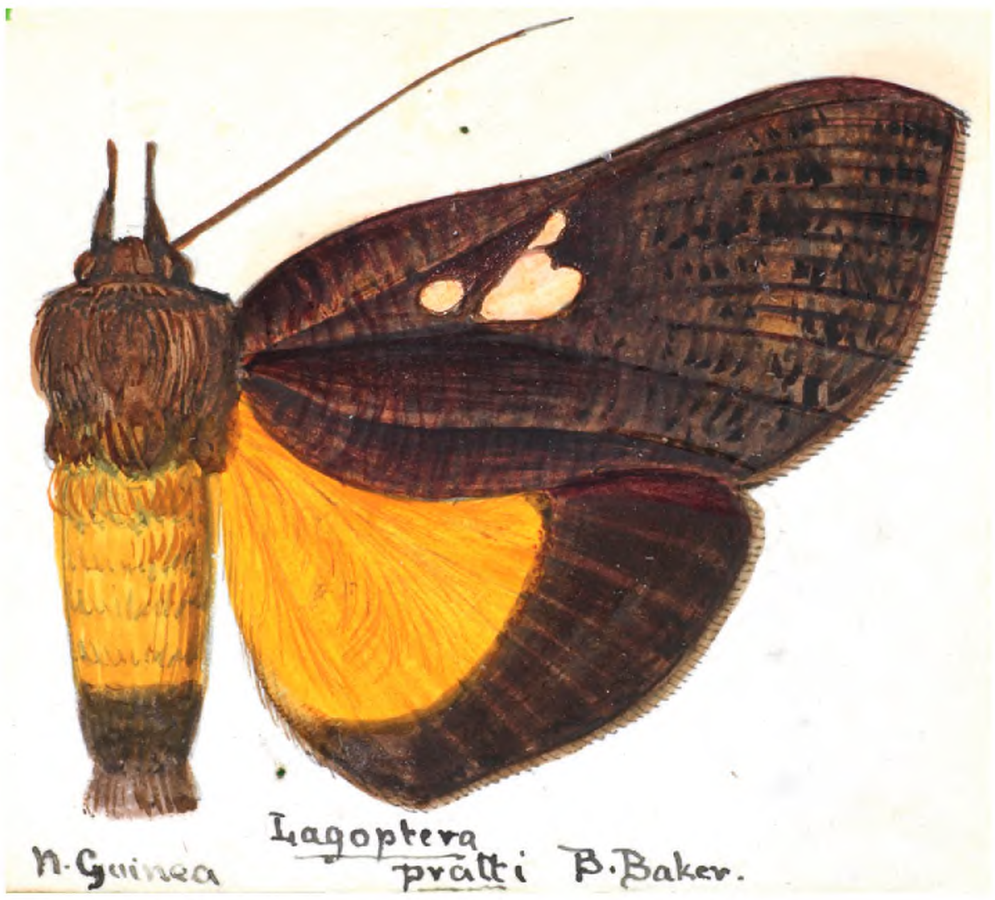
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Figures 1-5. Historical artwork on *Eudocima* species. 1 – Original drawing for Cramer's *Phalaena Noctua cajeta* (male) by Wartenaar Lambertz; 2 – ditto (underside); 3 – ditto (female); 4 – Original legend from plate 54 by Wartenaar Lambertz (undated); 5 – Drawing of holotype of *Lagoptera pratti* commissioned by G.F. Hampson.

























Figures 1-12. Syrphidae heads. 1-9 – Lateral view: 1 – *Ceriana ornata* (Saunders); 2 – *Chymophila fulgens* (Wiedemann); 3 – *Eristalinus (Lathyrophthalmus) aeneus* (Scopoli); 4 – *Keda conclusa* (Walker); 5 – *Matsumyia jesoensis* (Matsumura); 6 – *Rhingia* sp.; 7 – *Ornidia obesa* (Fabricius); 8 – *Paragus auritus* Stuckenberg; 9 – *Psilota* sp.; 10 – Anterolateral view of *Nepenthosyrphus* sp.; 11-12 – Ventral view: 11 – *Psilota* sp.; 12 – *Triglyphus primus* Loew.

Plate 168

















Figures 1-8. Syrphidae metasternum and metaleg, lateral view. 1 – *Mesembrius* sp.; 2 – *Paratropidia multicolor* (Ferguson); 3 – *Phytomia (Dolichomerus) crassus* (Fabricius); 4 – *Syritta pipiens* (Linnaeus); 5 – *Azpeytia* sp.; 6 – *Myolepta difformis* (Strobl); 7 – *Mallota (Tigridemyia) curvigaster* Macquart; 8 – *Eristalinus (Merodonoides) fasciatus* (Macquart).

Plate 169

















Figures 1-8. Syrphidae habitus, dorsal and lateral view. 1-2 – *Asiobaccha bicolor* Austen; 3-4 – *Dideoides coquilletti* (Goot); 5-6 – *Giluwea flavomaculata* Vockeroth; 7-8 – *Austrophilus terraereginae* (Ferguson).

Plate 170

















Figures 1-8. Syrphidae habitus, dorsal and lateral view. 1-2 – *Axona chalcopyga* (Wiedemann); 3-4 – *Azpeytia* sp.; 5-6 – *Chalcosyrphus (Neploneura) victoriensis* Ferguson; 7-8 – *Dissoptera heterothrix* (Meijere).

Plate 171

















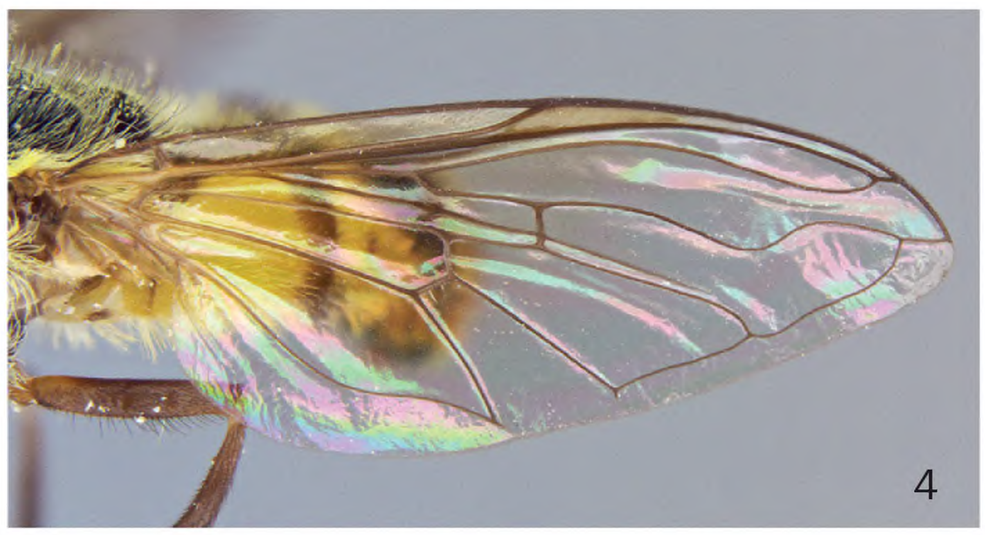
Figures 1-8. Syrphidae habitus, dorsal and lateral view. 1-2 – *Keda conclusa* (Walker); 3-4 – *Matsumyia jesoensis* (Matsumura); 5-6 – *Nepenthosyrphus* sp.; 7-8 – *Paratropidia multicolor* (Ferguson).

Plate 172



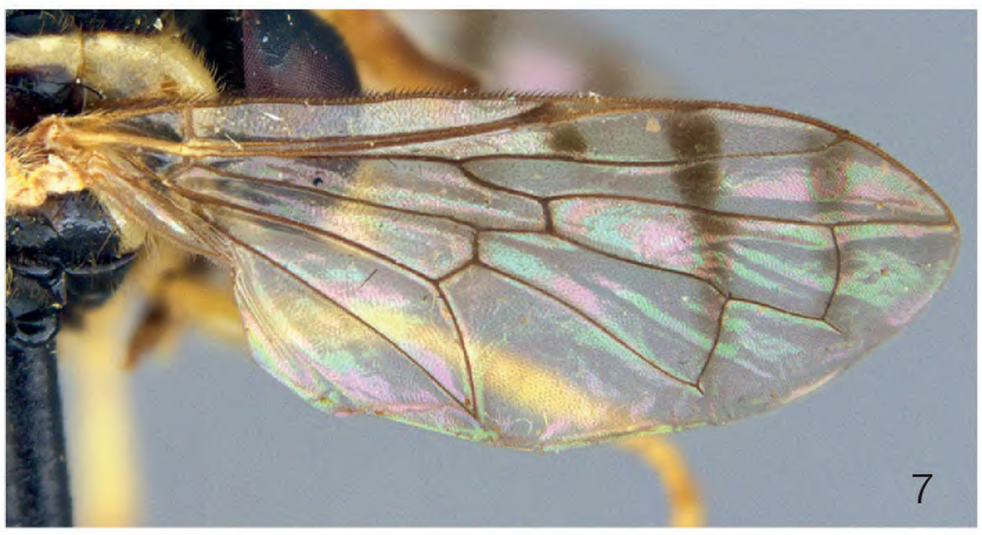






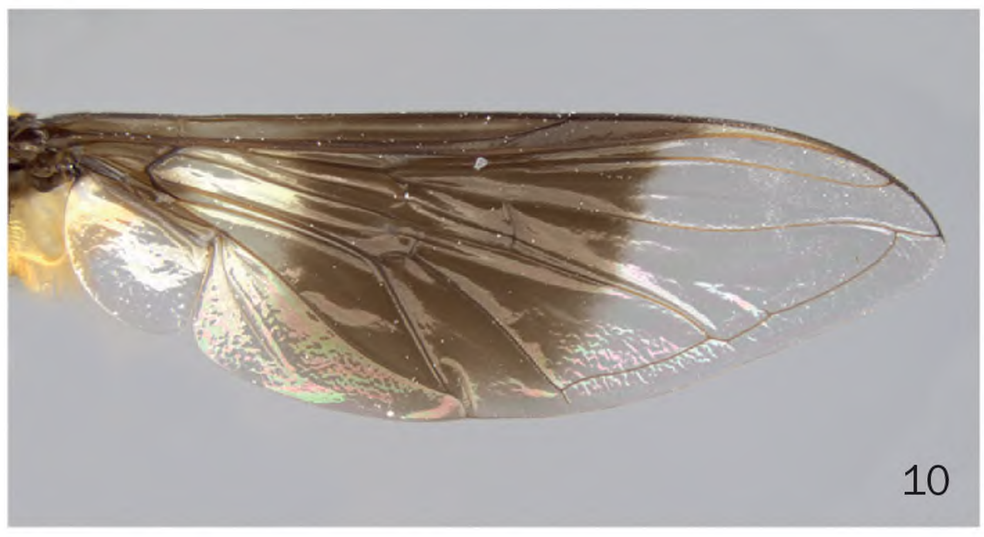












Figures 1-10. Syrphidae wings, dorsal view. 1 – *Austrophilus terraereginae* (Ferguson); 2 – *Ceriana (Ceriana) abbreviata* Loew; 3 – *Microdon (Chymophila) fulgens* (Wiedemann); 4 – *Dissoptera heterothrix* (Meijere); 5 – *Eumerus argentipes* Walker; 6 – *Giluwea flavomaculata* Vockeroth; 7 – *Graptomyza brevirostris* Wiedemann; 8 – *Ornidia obesa* (Fabricius); 9 – *Psilota* sp.; 10 – *Dideopsis aegrota* (Fabricius).

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